

# **Annual Monitoring Network Plan Report**



**June 2013**

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## **Executive Summary**

This document reports the status of the Clark County air monitoring network in 2012, as required by Title 40, Part 58 of the Code of Federal Regulations. It describes network operation in 2012, changes planned for 2013–2014, and the ways in which Clark County disseminates network data to the public in a timely manner.

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## ACRONYMS

AADT	annual average daily traffic
AQS	Air Quality System
CBSA	Core-Based Statistical Area
CFR	Code of Federal Regulations
DAQ	Clark County Department of Air Quality
EPA	U.S. Environmental Protection Agency
FEM	federal equivalent method
FRM	federal reference method
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standards
NPAP	National Performance Audit Program
PEP	Performance Evaluation Program
POC	parameter occurrence code
SLAMS	State/Local Air Monitoring System
TTP	through-the-probe

## Section 1: Introduction

This report serves as a review of the current Clark County Department of Air Quality (DAQ) air monitoring network and a plan for future network activities. During 2012, the following conditions existed:

1. DAQ operated monitoring instruments to measure ambient concentrations of continuous and filter-based particulate matter (PM)<sub>2.5</sub>, continuous PM<sub>10</sub>, ozone (O<sub>3</sub>), carbon monoxide (CO), nitrogen oxides (NO, NO<sub>2</sub>, NO<sub>x</sub>, NO<sub>y</sub>), sulfur dioxide (SO<sub>2</sub>), and lead (Pb).
2. DAQ operated under a quality-assured system.
3. DAQ operated visibility instrumentation at North Las Vegas Airport as a special project.

Criteria air pollutants are a group of six common air pollutants regulated by the U.S. Environmental Protection Agency (EPA), which developed [National Ambient Air Quality Standards \(NAAQS\)](#) for these pollutants to protect public health and the environment. The six criteria pollutants are O<sub>3</sub>, PM<sub>2.5</sub>/PM<sub>10</sub>, CO, NO<sub>2</sub>, SO<sub>2</sub>, and Pb.

Currently, Clark County meets the O<sub>3</sub>, PM<sub>2.5</sub>, CO, and NO<sub>2</sub> NAAQS, and is unclassifiable for SO<sub>2</sub> and Pb. The Las Vegas Valley (Hydrographic Area 212) within Clark County is classified as a serious nonattainment area for PM<sub>10</sub>. The area had attained the PM<sub>10</sub> standard as of December 31, 2006, and EPA issued a “Finding of Attainment” in August 2010. However, the area cannot be formally redesignated as in attainment until EPA approves the *Request for Redesignation and Maintenance Plan for PM<sub>10</sub>*, submitted by DAQ in August 2012. EPA action on the request is pending.

Air quality data is disseminated to the public in a timely manner via the DAQ website and EPA’s Airnow database. DAQ also provides customized data reports upon request.

## Section 2: Minimum Monitoring Requirements

The tables below show that the Clark County air quality network meets or exceeds the minimum requirements of Title 40, Part 58 of the Code of Federal Regulations (40 CFR 58).

### 2.1 Ozone

Table 1. Minimum Monitoring Requirements for Ozone

MSA <sup>1</sup>	County	Population & Census Year	8-hr Design Value [ppb], DV Years <sup>2</sup>	Design Value site (name, AQS ID <sup>3</sup> )	# Required Monitors	# Active Monitors	# Add'l Monitors Needed
Las Vegas-Paradise (29820)	Clark, NV	1,969,975 (2011)	76, 2010-12	Joe Neal (32-003-0075)	2	11	0
Las Vegas-Paradise (29820)	Clark, NV	1,969,975 (2011)	76, 2010-12	Walter Johnson (32-003-0071)	2	11	0

<sup>1</sup> Metropolitan Statistical Area.

<sup>2</sup> DV Years = the three years over which the design value was calculated (e.g., 2010-2012).

<sup>3</sup> Air Quality System (site) Identification.

Monitors required for SIP or maintenance plan: NA

This network meets the minimum monitoring requirement for the referenced criteria pollutant.

### 2.2 PM<sub>2.5</sub>

Table 2. Minimum Monitoring Requirements for PM<sub>2.5</sub>

MSA	County	Pop. & Census Yr	Annual Design Value [ $\mu\text{g}/\text{m}^3$ ], DV Years <sup>1</sup>	Annual Design Value Site (name, AQS ID)	Daily Design Value [ $\mu\text{g}/\text{m}^3$ ], DV years	Daily Design Value Site (name, AQS ID)	# Required SLAMS Monitors	# Active SLAMS Monitors	# Add'l SLAMS Monitors Needed
Las Vegas-Paradise (29820)	Clark, NV	1,969,975 (2011)	7.7, 2010-12	Sunrise Acres (32-003-0561)	21, 2010-12	Sunrise Acres (32-003-0561)	2	4 + collocation	0

<sup>1</sup> DV Years = the three years over which the design value was calculated (e.g., 2010-2012).

<sup>2</sup> This applies to all non-federal reference method (FRM) or -federal equivalence method (FEM) designated instruments, or when there is not enough FRM or FEM data to make a design value determination.

Monitors required for SIP or maintenance plan: NA

This network meets the minimum monitoring requirement for the referenced criteria pollutant.

## 2.3 PM<sub>10</sub>

Table 3. Minimum Monitoring Requirements for PM<sub>10</sub>

MSA	County	Pop. & Census Year	Max. Concentration in 2012 [ $\mu\text{g}/\text{m}^3$ ]	Max. Conc. Site (name, AQS ID)	# Req'd Monitors	# Active Monitors	# Add'l Monitors Needed
Las Vegas-Paradise (29820)	Clark, NV	1,969,975 (2011)	314	Boulder City (32-003-0601)	4-8	9	0

Monitors required for SIP or maintenance plan: NA

This network meets the minimum monitoring requirement for the referenced criteria pollutant.

## 2.4 NO<sub>2</sub>

Table 4. Minimum Monitoring Requirements for NO<sub>2</sub>

CBSA <sup>1</sup>	Pop. & Census Year	Max AADT Counts (yr)	# Req'd Near-road Monitors	# Active Near-road Monitors	# Add'l Near-road Monitors Needed	# Req'd Area-wide Monitors	# Active Areawide Monitors	# Add'l Area-wide Monitors Needed
Las Vegas-Paradise-Pahrump (332)	1,969,975 (2011)	6,130	0	0	1	1	2	0

<sup>1</sup> Core-Based Statistical Area.

Monitors required for SIP or maintenance plan: NA. J.D. Smith and Sunrise Acres meet requirements for areawide monitors; Sunrise Acres meets RA40 requirements.

Monitors required for Photochemical Assessment Monitoring Station: NA

EPA Regional Administrator-required monitors per 40 CFR 58, App. D, Sec. 4.3.4: 1

Near-road NO<sub>2</sub> monitoring must commence in 2014.

## 2.5 SO<sub>2</sub>

Table 5. Minimum Monitoring Requirements for SO<sub>2</sub>

CBSA	County	Pop. & Census Year	Total SO <sub>2</sub> <sup>1</sup> [tons/yr]	Pop. Weighted Emissions Index <sup>2</sup> [million persons-tons/yr]	# Req'd Monitors	# Active Monitors	# Add'l Monitors Needed
Las Vegas-Paradise-Pahrump (332)	Clark, NV	1,969,975 (2011)	6,725	13,450 (est.)	1	1	0

<sup>1</sup>Using 2008 NEI data.

<sup>2</sup>Calculated by multiplying CBSA population and total SO<sub>2</sub> and dividing product by one million.

Population Weighted Emissions Index requirements met.  
 Monitors required for SIP or maintenance plan: NA  
 EPA Regional Administrator-required monitors per 40 CFR 58, App. D, Sec. 4.4.3: 0  
This network meets the minimum monitoring requirement for the referenced criteria pollutant.

## 2.6 CO

Table 6. Minimum Monitoring Requirements for CO

CBSA	Pop. & Census Year	# Req'd Near-Road Monitors	# Active Near-Road Monitors	# Add'l Monitors Needed
Las Vegas-Paradise-Pahrump (332)	1,969,975 (2011)	0	0	0

Monitors required for SIP or maintenance plan: NA  
 EPA Regional Administrator-required monitors per 40 CFR 58, App. D, Sec. 4.2.2: 0  
This network meets the minimum monitoring requirement for the referenced criteria pollutant.

## 2.7 Pb

The source emission threshold for the ambient source-oriented Pb monitoring requirement is 0.50 tons per year. DAQ has not identified sources that might trigger this requirement, and a preliminary assessment has shown no such sources within Clark County. Therefore, DAQ does not conduct source-oriented Pb monitoring.

Table 7. Minimum Monitoring Requirements for Pb at NCore

NCore Site (name, AQS ID)	CBSA	Pop. & Census Year	# Req'd Monitors	# Active Monitors	# Add'l Monitors Needed
Jerome Mack Middle School (32-003-0540)	Las Vegas-Paradise-Pahrump (332)	1,969,975 (2011)	1	1	0

Monitors required for SIP or maintenance plan: NA  
This network meets the minimum monitoring requirement for the referenced criteria pollutant.

### Section 3: Collocated Monitors

Table 8. Filter-Based PM<sub>2.5</sub> FRM Network

Method Code	# Primary Monitors, Site	# Required Collocated Monitors	# Active Collocated Monitors
RFPS-0498-118	1, Sunrise Acres	1	1 QA collocated
RFPS-0598-120	2, Jean and Jerome Mack	1	0

DAQ has two PM<sub>2.5</sub> methods operating in its network: the existing Andersen Model 300 (Method RFPS-0598-120), and the newer Thermo Model 2025i (Method RFPS-0498-118). The Andersen Model 300 samplers are well beyond their life expectancy, and are no longer supported; therefore, DAQ is acquiring, acceptance testing, deploying, and field testing Thermo Model 2025i samplers to replace them in the network. DAQ anticipates completing this transition in 2013, at which time there will only be one PM<sub>2.5</sub> FRM method in place. It will, however, be fully compliant with collocation requirements.

Table 9. Continuous PM<sub>2.5</sub> FEM Network

Method Code	# Primary Monitors, Site	# Required Collocated Monitors	# Active Collocated FRM Monitors	# Active Collocated FEM Monitors (same method designation as primary)
EQPM-0609-183	1, J.D. Smith	1	0	0

Currently, all DAQ sites but one with continuous PM<sub>2.5</sub> FEM monitors also have a PM<sub>2.5</sub> FRM sampler, which is the primary monitor for that site. The one exception is J.D. Smith, where the continuous PM<sub>2.5</sub> FEM monitor is the only PM<sub>2.5</sub> instrument on site. 40 CFR 58, Appendix A requires 15% of PM<sub>2.5</sub> instruments to be collocated, both FRMs and FEMs. Since J.D. Smith's only PM<sub>2.5</sub> measurement is with an FEM method, it is considered primary and comparable to the NAAQS. J.D. Smith and Sunrise Acres share the same PM<sub>2.5</sub> FEM methodology.

To meet the PM<sub>2.5</sub> FEM collocation requirement, DAQ proposes classifying the PM<sub>2.5</sub> FEM at Sunrise Acres as the primary PM<sub>2.5</sub> monitor at that site. The current PM<sub>2.5</sub> primary FRM at Sunrise would be moved to Jerome Mack and collocated with a similar FRM. The remaining collocated FRM at Sunrise Acres would serve as the collocation for the PM<sub>2.5</sub> FEM network, running on a one-in-three-day schedule.

## Section 4: Site Tables

**Figure 1: Apex.**



The primary objective of this site, approximately 25 miles northeast of Las Vegas, is to monitor the ambient impacts of emissions from nearby processing facilities and power plants. Since the site is generally downwind from Las Vegas, it also serves as an indicator of pollutant transport flow out of the Las Vegas Valley. It is the only Air Quality monitoring station in the Apex Valley. Apex is an EPA-approved seasonal O<sub>3</sub> monitoring site that operates between April and September.

Local Site Name (AQS ID)	Apex (32-003-0022)
GPS Coordinates (latitude, longitude)	+36.391111°, -114.907500°
Street Address	12101 U.S. Highway 93, Las Vegas, NV 89030
Distance to roadway (m)	108
Traffic count (AADT, yr)	2200 (2011)
Ground cover	Native desert
Representative statistical area name	Las Vegas-Paradise MSA

<b>Pollutant, POC</b>	<b>O<sub>3</sub>, 1</b>
Parameter code	44201
Basic monitoring objective(s)	NAAQS comparison
Site type(s)	Regional transport
Monitor type(s)	SLAMS

Pollutant, POC	O <sub>3</sub> , 1
Instrument manufacturer & model	TAPI 400 series
Method code	EQOA-0992-087
FRM/FEM/ARM/other	FEM
Collecting agency	DAQ
Analytical lab	NA
Reporting agency	DAQ
Spatial scale	Regional
Monitoring start date	01/01/1998
Current sampling frequency	Continuous, seasonal
Calculated sampling frequency	Continuous, seasonal
Sampling season	04/01-09/30
Probe height (m)	3.8
Distance from supporting structure (m)	1.3
Distance from obstructions on roof (m)	None
Distance from obstructions not on roof (m)	None
Distance from trees (m)	NA
Distance to furnace or incinerator flue (m)	NA
Distance between collocated monitors (m)	NA
Unrestricted airflow (degrees)	360
Probe material for reactive gases	Teflon
Residence time for reactive gases (s)	2.3
Will there be changes within the next 18 months? (Y/N)	N
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	NA
Frequency of flow rate verification for manual PM samplers	NA
Frequency of flow rate verification for automated PM analyzers	NA
Frequency of one-point QC check for gaseous instruments	Daily
Last annual performance evaluation for gaseous parameters	04/19/2012; 06/18/2012
Last two semiannual flow rate audits for PM monitors	NA

Meteorological measurements include wind speed, wind direction, and ambient temperature.

**Figure 2: Boulder City.**

This site, approximately 25 miles southeast of Las Vegas, was established at the request of Boulder City government officials and residents to serve as an indicator of population exposure to pollutants, particularly O<sub>3</sub> and PM<sub>10</sub>.

Local Site Name (AQS ID)	Boulder City (32-003-0601)
GPS Coordinates (latitude, longitude)	+35.978056°, -114.846389°
Street Address	1005 Industrial Rd., Boulder City, NV 89005
Distance to roadway (m)	58
Traffic count (AADT, yr)	1,700 (2011)
Ground cover	Paved, native desert
Representative statistical area name	Las Vegas-Paradise MSA

4.1 Pollutant, POC	PM <sub>10</sub> , 1	O <sub>3</sub> , 1
Parameter code	81102	44201
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure, regional transport
Monitor type(s)	SLAMS	SLAMS
Instrument manufacturer & model	Thermo FH62C14	TAPI 400 series
Method code	EQPM-1102-150	EQOA-0992-087
FRM/FEM/ARM/other	FEM	FEM
Collecting agency	DAQ	DAQ

<b>4.1 Pollutant, POC</b>	<b>PM<sub>10</sub>, 1</b>	<b>O<sub>3</sub>, 1</b>
Analytical lab	NA	NA
Reporting agency	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood
Monitoring start date	01/01/1998	07/01/1998
Current sampling frequency	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous
Sampling season	Year-round	Year-round
Probe height (m)	5.2	4.1
Distance from supporting structure (m)	1.2	1.2
Distance from obstructions on roof (m)	None	None
Distance from obstructions not on roof (m)	None	None
Distance from trees (m)	NA	NA
Distance to furnace or incinerator flue (m)	NA	NA
Distance between collocated monitors (m)	NA	NA
Unrestricted airflow (degrees)	360	360
Probe material for reactive gases	NA	Teflon
Residence time for reactive gases (s)	NA	2.7
Will there be changes within the next 18 months? (Y/N)	N	N
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	NA	NA
Frequency of flow rate verification for manual PM samplers	NA	NA
Frequency of flow rate verification for automated PM analyzers	Biweekly	NA
Frequency of one-point QC check for gaseous instruments	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	04/18/2012; 06/19/2012
Last two semiannual flow rate audits for PM monitors	03/22/2012; 09/21/2012	NA

Meteorological measurements include wind speed, wind direction, ambient temperature, and barometric pressure.

**Figure 3: Green Valley.**

This site in Henderson was established in response to citizen complaints about dust emissions from a gravel processing plant, and continues to monitor PM<sub>10</sub> and PM<sub>2.5</sub>.

Local Site Name (AQS ID)	Green Valley (32-003-0298)
GPS Coordinates (latitude, longitude)	+36.048611°, -115.052778°
Street Address	298 Arroyo Grande Blvd., Henderson, NV 89014
Distance to roadway (m)	12.2
Traffic count (AADT, yr)	3,900 (2011)
Ground cover	Paved, gravel
Representative statistical area name	Las Vegas-Paradise MSA

Pollutant, POC	PM <sub>10</sub> , 1	PM <sub>2.5</sub> (cont.), 3
Parameter code	81102	88502
Basic monitoring objective(s)	NAAQS comparison	Provide timely air pollution data to public
Site type(s)	Population exposure	Population exposure
Monitor type(s)	SLAMS	Non-regulatory
Instrument manufacturer & model	Thermo FH62C14	Thermo FH62C14
Method code	EQPM-1102-150	NA
FRM/FEM/ARM/other	FEM	Other
Collecting agency	DAQ	DAQ
Analytical lab	NA	NA

Pollutant, POC	PM <sub>10</sub> , 1	PM <sub>2.5</sub> (cont.), 3
Reporting agency	DAQ	DAQ
Spatial scale	Middle	Middle
Monitoring start date	01/01/1998	01/01/2003
Current sampling frequency	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous
Sampling season	Year-round	Year-round
Probe height (m)	4.8	4.9
Distance from supporting structure (m)	1.8	1.9
Distance from obstructions on roof (m)	NA	NA
Distance from obstructions not on roof (m)	NA	NA
Distance from trees (m)	6.5	4.0
Distance to furnace or incinerator flue (m)	NA	NA
Distance between collocated monitors (m)	2.5	2.5
Unrestricted airflow (degrees)	360	360
Probe material for reactive gases	NA	NA
Residence time for reactive gases (s)	NA	NA
Will there be changes within the next 18 months? (Y/N)	N	Yes, continuous PM <sub>2.5</sub> FEM deployment anticipated in place of current instrument
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA
Frequency of flow rate verification for automated PM analyzers	Biweekly	Biweekly
Frequency of one-point QC check for gaseous instruments	NA	NA
Last annual performance evaluation for gaseous parameters	NA	NA
Last two semiannual flow rate audits for PM monitors	03/15/2012; 09/20/2012	03/15/2012; 09/20/2012

Meteorological measurements include wind speed, wind direction, ambient temperature, and barometric pressure.

**Figure 4: J.D. Smith.**

This site in North Las Vegas replaced the old McDaniel and Post Office PM sites. It monitors gaseous ( $\text{NO}_2$ ,  $\text{CO}$ , and  $\text{O}_3$ ) and particulate ( $\text{PM}_{10}$  and  $\text{PM}_{2.5}$ ) pollutants using continuous methods. It also serves as an indicator of population exposure to pollutants.

Local Site Name (AQS ID)	J.D. Smith (32-003-2002)
GPS Coordinates (latitude, longitude)	+36.191111°, -115.123056°
Street Address	1301B Tonopah Ave., North Las Vegas, NV 89030
Distance to roadway (m)	135
Traffic count (AADT, yr)	7,600 (2011)
Ground cover	Paved, grass
Representative statistical area name	Las Vegas-Paradise MSA

Pollutant, POC	$\text{PM}_{10}$ , 1	$\text{CO}$ , 1	$\text{NO}_2$ , 1	$\text{O}_3$ , 1	$\text{PM}_{2.5}$ (cont.), 3
Parameter code	81102	42101	42602	44201	88101
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure	Highest concentration	Population exposure	Population exposure
Monitor type(s)	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS

Pollutant, POC	PM <sub>10</sub> , 1	CO, 1	NO <sub>2</sub> , 1	O <sub>3</sub> , 1	PM <sub>2.5</sub> (cont.), 3
Instrument manufacturer & model	Thermo FH62C14	TAPI 300 series	TAPI 200 series	TAPI 400 series	Thermo 5014i
Method code	EQPM-1102-150	RFCA-1093-093	RFNA-1194-099	EQOA-0992-087	EQPM-0609-183
FRM/FEM/ARM/other	FEM	FRM	FRM	FEM	Other
Collecting agency	DAQ	DAQ	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	01/01/1998	01/10/1998	01/10/1998	01/10/1998	01/01/2013
Current sampling frequency	Continuous	Continuous	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	Year-round	Year-round
Probe height (m)	4.7	3.7	3.7	3.7	4.8
Distance from supporting structure (m)	2.0	1.2	1.2	1.2	2.1
Distance from obstructions on roof (m)	NA	NA	NA	NA	NA
Distance from obstructions not on roof (m) Wall obstruction height: 5.7	3.3	4.2	4.2	4.2	5.9
Distance from trees (m)	35	32.8	32.8	32.8	35
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA	NA
Distance between collocated monitors (m)	2.6	NA	NA	NA	2.6
Unrestricted airflow (degrees)	360	360	360	360	360
Probe material for reactive gases	NA	Teflon	Teflon	Teflon	NA
Residence time for reactive gases (s)	NA	6.6	9.8	6.0	NA
Will there be changes within the next 18 months? (Y/N)	N	N	N	N	N
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	N	N	N	N	Y
Frequency of flow rate verification for manual PM samplers	NA	NA	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Biweekly	NA	NA	NA	Biweekly

<b>Pollutant, POC</b>	<b>PM<sub>10</sub>, 1</b>	<b>CO, 1</b>	<b>NO<sub>2</sub>, 1</b>	<b>O<sub>3</sub>, 1</b>	<b>PM<sub>2.5</sub> (cont.), 3</b>
Frequency of one-point QC check for gaseous instruments	NA	Daily	Daily	Daily	NA
Last annual performance evaluation for gaseous parameters	NA	12/14/2012	12/14/2012	12/04/2012	NA
Last two semiannual flow rate audits for PM monitors	06/29/2012; 11/28/2012	NA	NA	NA	06/29/2012; 11/28/2012

Meteorological measurements include wind speed, wind direction, ambient temperature, relative humidity, and barometric pressure.

**Figure 5: Jean.**

The Jean site is approximately 30 miles south of Las Vegas. This site was originally set up as an upwind background site; it still serves this purpose for PM. The primary objective for O<sub>3</sub> monitoring is to measure transport from southern California.

Local Site Name (AQS ID)	Jean (32-003-1019)
GPS Coordinates (latitude, longitude)	+35.785556°, -115.356944°
Street Address	1965 State Route 161, Jean, NV 89019
Distance to roadway (m)	1,287
Traffic count (AADT, yr)	1,600 (2011)
Ground cover	Gravel, native desert
Representative statistical area name	Las Vegas-Paradise MSA

Pollutant, POC	PM <sub>10</sub> , 1	PM <sub>2.5</sub> (FRM), 1	O <sub>3</sub> , 1	PM <sub>2.5</sub> (cont.), 3
Parameter code	81102	88101	44201	88502
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison	Provide timely air pollution data to public
Site type(s)	Upwind background	Upwind background	Regional transport	Upwind background
Monitor type(s)	SLAMS	SLAMS	SLAMS	Non-regulatory
Instrument manufacturer & model	Thermo FH62C14	Andersen 300 RAAS	API 400 series	Thermo FH62C14
Method code	EQPM-1102-150	RFPS-0598-120	EQOA-0992-087	NA
FRM/FEM/ARM/other	FEM	FRM	FEM	Other
Collecting agency	DAQ	DAQ	DAQ	DAQ
Analytical lab	NA	Weigh	NA	NA
Reporting agency	DAQ	DAQ	DAQ	DAQ

Pollutant, POC	PM <sub>10</sub> , 1	PM <sub>2.5</sub> (FRM), 1	O <sub>3</sub> , 1	PM <sub>2.5</sub> (cont.), 3
Spatial scale	Regional	Regional	Regional	Regional
Monitoring start date	01/01/1995	01/01/1999	08/01/1998	05/26/2007
Current sampling frequency	Continuous	1:3	Continuous	Continuous
Calculated sampling frequency	Continuous	1:3	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	Year-round
Probe height (m)	4.8	2.0	4	4.9
Distance from supporting structure (m)	2.0	2.0	1.4	2.1
Distance from obstructions on roof (m)	NA	NA	NA	NA
Distance from obstructions not on roof (m)	NA	NA	NA	NA
Distance from trees (m)	NA	NA	NA	NA
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA
Distance between collocated monitors (m)	2.7	NA	NA	2.7
Unrestricted airflow (degrees)	360	360	360	360
Probe material for reactive gases	NA	NA	Teflon	NA
Residence time for reactive gases (s)	NA	NA	6.2	NA
Will there be changes within the next 18 months? (Y/N)	N	Yes, anticipate deploying Thermo 2025i FRM to replace Andersen 300	N	Yes, continuous PM <sub>2.5</sub> FEM deployment anticipated in place of current instrument
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	N	Y	N	N
Frequency of flow rate verification for manual PM samplers	NA	Monthly	NA	NA
Frequency of flow rate verification for automated PM analyzers	Biweekly	NA	NA	Biweekly
Frequency of one-point QC check for gaseous instruments	NA	NA	Daily	NA
Last annual performance evaluation for gaseous parameters	NA	NA	12/03/2012	NA
Last two semiannual flow rate audits for PM monitors	03/15/2012; 09/20/2012	03/15; 06/28; 09/20; 11/30/2012	NA	03/15/2012; 09/20/2012

Meteorological measurements include wind speed, wind direction, ambient temperature, solar radiation, and barometric pressure.

**Figure 7: Jerome Mack.**



This site in east Las Vegas is the Clark County NCore site. Its primary objective is to monitor trace-level gaseous pollutants, PM parameters (including PM<sub>2.5</sub>, PM coarse, and speciated PM parameters), and meteorological parameters as part of a nationwide network. Because of NCore requirements, speciation sampling was moved here from the East Craig Road site in May 2010.

Local Site Name (AQS ID)	Jerome Mack (32-003-0540)
GPS Coordinates (latitude, longitude)	+36.141944°, -115.078611°
Street Address	4250 Karen Avenue, Las Vegas, NV 89121
Distance to roadway (m)	482
Traffic count (AADT, yr)	25,000 (2011)
Ground cover	Concrete, grass
Representative statistical area name	Las Vegas-Paradise MSA

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Pollutant, POC	PM <sub>10</sub> , 3	PM <sub>2.5</sub> (cont.), 3	PM <sub>10-2.5</sub> (cont.), 3	PM <sub>2.5</sub> (FRM), 1	Speciation SASS, 5	Speciation URG, 5	O <sub>3</sub> , 1	NO <sub>y</sub> , 1	Trace CO, 1	Trace SO <sub>2</sub> , 1	Pb, 1
Parameter code	81102	88101	86101	88101	88502	88355	44201	42600	42101	42401	14129
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	Research support	NAAQS comparison	Research support	Research support	NAAQS comparison	Research support	Research support	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure	Population exposure	Population exposure	Highest concentration	Highest concentration	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure
Monitor type(s)	NCORE	NCORE	NCORE	NCORE	NCORE	NCORE	NCORE	NCORE	NCORE	NCORE	NCORE
Instrument manufacturer & model	Metone BAM 1020	Metone BAM 1020	Metone BAM 1020 (mathematical difference)	Andersen 300 RAAS	Met One SASS	URG 3000	TAPI 400 series	TAPI 200EU	TAPI 300EU	TAPI 100EU	American Ecotech HiVol 3000
Method code	EQPM-0308-170	EQPM-0308-170	EQPM-0709-185	RFPS-0598-120	NA	NA	EQOA-0992-087	NA	RFCA-1093-093	EQSA-0495-100	EQL-0510-191
FRM/FEM/ARM/other	FEM	FEM	FEM	FRM	Other	Other	FEM	Other	FRM	FEM	FEM
Collecting agency	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA	Weigh	RTI	RTI	NA	NA	NA	NA	RTI
Reporting agency	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Urban	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	01/01/2012	01/01/2012	01/01/2012	10/02/2010	05/2010	05/2010	01/01/2011	01/01/2011	01/01/2011	01/01/2011	01/01/2012
Current sampling frequency	Continuous	Continuous	Continuous	1:3	1:3	1:3	Continuous	Continuous	Continuous	Continuous	1:6
Calculated sampling frequency	Continuous	Continuous	Continuous	1:3	1:3	1:3	Continuous	Continuous	Continuous	Continuous	1:6
Sampling season	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round
Probe height (m)	4.7	5.0	4.7 & 5.0	3.0	2.8	3.0	3.8	7.0	3.8	3.8	2.2

Pollutant, POC	PM <sub>10</sub> , 3	PM <sub>2.5</sub> (cont.), 3	PM <sub>10-2.5</sub> (cont.), 3	PM <sub>2.5</sub> (FRM), 1	Speciation SASS, 5	Speciation URG, 5	O <sub>3</sub> , 1	NO <sub>y</sub> , 1	Trace CO, 1	Trace SO <sub>2</sub> , 1	Pb, 1
Distance from supporting structure (m)	1.7	2.0	1.7 & 2.0	2.0	1.8	2.0	1.3	7.0	1.3	1.3	1.2
Distance from obstructions on roof (m)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Distance from obstructions not on roof (m)	NA	NA	NA	25	25	25	19	19	19	19	25
Distance from trees (m)	NA	NA	NA	25	25	25	18	19	18	18	25
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Distance between collocated monitors (m)	2.7	2.7	NA	NA	2.3	2.3	NA	NA	NA	NA	NA
Probe material for reactive gases	NA	NA	NA	NA	NA	NA	Teflon	Teflon	Teflon	Teflon	NA
Residence time for reactive gases (s)	NA	NA	NA	NA	NA	NA	2.6	NA	1.0	3.1	NA
Will there be changes within the next 18 months? (Y/N)	N	N	N	Y	N	N	N	N	N	N	N
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	N	Y	N	Y	N	N	N	N	N	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA	Monthly	Monthly	Monthly	NA	NA	NA	NA	Monthly
Frequency of flow rate verification for automated PM analyzers	Biweekly	Biweekly	Biweekly	NA	NA	NA	NA	NA	NA	NA	NA

Pollutant, POC	PM <sub>10</sub> , 3	PM <sub>2.5</sub> (cont.), 3	PM <sub>10-2.5</sub> (cont.), 3	PM <sub>2.5</sub> (FRM), 1	Speciation SASS, 5	Speciation URG, 5	O <sub>3</sub> , 1	NO <sub>y</sub> , 1	Trace CO, 1	Trace SO <sub>2</sub> , 1	Pb, 1
Frequency of one-point QC check for gaseous instruments	NA	NA	NA	NA	NA	NA	Daily	Daily	Daily	Daily	NA
Last annual performance evaluation for gaseous parameters	NA	NA	NA	NA	NA	NA	12/05/2012	None	12/19/2012	12/20/2012	NA
Last two semi-annual flow rate audits for PM monitors	6/29/2012; 11/28/2012	06/29/2012; 11/28/2012	NA	03/21/2012; 06/27/2012; 09/26/2012; 12/07/2012	03/21/2012; 06/27/2012; 9/26/2012; 12/07/2012	03/21/2012; 06/27/2012; 09/26/2012; 12/07/2012	NA	NA	NA	NA	03/21/2012; 06/27/2012

Meteorological measurements include wind speed, wind direction, ambient temperature, relative humidity, precipitation, and barometric pressure.

**Figure 8: Joe Neal.**

The primary objectives of this site in northwest Las Vegas are to monitor O<sub>3</sub> and its precursors in an area of high O<sub>3</sub> concentrations, and to support DAQ modeling efforts. The topography is such that the summertime loft brings higher O<sub>3</sub> and precursor levels toward this site from the east end of the Las Vegas Valley. PM<sub>10</sub> was initially deployed at this site due to population growth in the northwest, and the site continues to serve as a high O<sub>3</sub> indicator. A NO<sub>x</sub> monitor was added in January 2008 to monitor for O<sub>3</sub> precursors.

Local Site Name (AQS ID)	Joe Neal (32-003-0075)
GPS Coordinates (latitude, longitude)	+36.270556°, -115.238333°
Street Address	6651 W. Azure Way, Las Vegas, NV 89130
Distance to roadway (m)	12.6
Traffic count (AADT, yr)	4,000 (2011) (estimated)
Ground cover	Gravel, grass, pavement
Representative statistical area name	Las Vegas-Paradise MSA

Pollutant, POC	PM <sub>10</sub> , 1	O <sub>3</sub> , 1	NO <sub>2</sub> , 1
Parameter code	81102	44201	42602
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	Research support
Site type(s)	Population exposure	Max .ozone concentration	Max. precursor impact
Monitor type(s)	SLAMS	SLAMS	SLAMS
Instrument manufacturer & model	Thermo FH62C14	API 400 series	API 200 series
Method code	EQPM-1102-150	EQOA-0992-087	RFNA-1194-099
FRM/FEM/ARM/other	FEM	FEM	FRM
Collecting agency	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ

Pollutant, POC	PM <sub>10</sub> , 1	O <sub>3</sub> , 1	NO <sub>2</sub> , 1
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	01/01/2001	07/01/2000	01/01/2008
Current sampling frequency	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round
Probe height (m)	4.7	3.8	3.8
Distance from supporting structure (m)	2.2	1.4	1.4
Distance from obstructions on roof (m)	NA	NA	NA
Distance from obstructions not on roof (m)	NA	NA	NA
Distance from trees (m)	8.2	5.7	5.7
Distance to furnace or incinerator flue (m)	NA	NA	NA
Distance between collocated monitors (m)	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360
Probe material for reactive gases	NA	Teflon	Teflon
Residence time for reactive gases (s)	NA	6.6	10.7
Will there be changes within the next 18 months? (Y/N)	N	N	N
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	N	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Biweekly	NA	NA
Frequency of one-point QC check for gaseous instruments	NA	Daily	Daily
Last annual performance evaluation for gaseous parameters	NA	08/14/2012	12/13/2012
Last two semiannual flow rate audits for PM monitors	06/27/2012; 11/27/2012	NA	NA

Meteorological measurements include wind speed, wind direction, ambient temperature, relative humidity, solar radiation, and barometric pressure.

**Figure 9: Mesquite.**

This site, approximately 70 miles north of Las Vegas and monitors O<sub>3</sub>. It sits along a transport and exit corridor for jurisdictional boundaries, and serves as an indicator of population exposure to pollutants. Mesquite is an EPA-approved seasonal O<sub>3</sub> monitoring site that operates between April and September.

Local Site Name (AQS ID)	Mesquite (32-003-0023)
GPS Coordinates (latitude, longitude)	+36.807778°, -114.061389°
Street Address	465 E. Old Mill Rd., Mesquite, NV 89027
Distance to roadway (m)	7.7
Traffic count (AADT, yr)	<1,000 (estimate), 2013
Ground cover	Pavement, gravel
Representative statistical area name	Las Vegas-Paradise MSA

<b>Pollutant, POC</b>	<b>O<sub>3</sub>, 1</b>
Parameter code	44201
Basic monitoring objective(s)	NAAQS comparison
Site type(s)	Population exposure
Monitor type(s)	SLAMS
Instrument manufacturer & model	API 400 series
Method code	EQOA-0992-087
FRM/FEM/ARM/other	FEM
Collecting agency	DAQ

Pollutant, POC	O <sub>3</sub> , 1
Analytical lab	NA
Reporting agency	DAQ
Spatial scale	Neighborhood
Monitoring start date	10/01/2001
Current sampling frequency	Continuous, seasonal
Calculated sampling frequency	Continuous, seasonal
Sampling season	04/01-09/30
Probe height (m)	3.6
Distance from supporting structure (m)	1.2
Distance from obstructions on roof (m)	NA
Distance from obstructions not on roof (m)	NA
Distance from trees (m)	24
Distance to furnace or incinerator flue (m)	NA
Distance between collocated monitors (m)	NA
Unrestricted airflow (degrees)	360
Probe material for reactive gases	Teflon
Residence time for reactive gases (s)	2.7
Will there be changes within the next 18 months? (Y/N)	N
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	N
Frequency of flow rate verification for manual PM samplers	NA
Frequency of flow rate verification for automated PM analyzers	NA
Frequency of one-point QC check for gaseous instruments	Daily
Last annual performance evaluation for gaseous parameters	06/20/2012
Last two semiannual flow rate audits for PM monitors	NA

Meteorological measurements include wind speed, wind direction, and ambient temperature.

**Figure 10: Palo Verde.**

The primary objective of this site in west Las Vegas is to monitor O<sub>3</sub>, but it also monitors PM<sub>10</sub>. The topography is such that the summertime loft brings higher O<sub>3</sub> and precursor levels toward this site from the east end of the Las Vegas Valley.

Local Site Name (AQS ID)	Palo Verde (32-003-0073)
GPS Coordinates (latitude, longitude)	+36.173333°, -115.332778°
Street Address	333 Pavilion Center Dr., Las Vegas, NV 89144
Distance to roadway (m)	14.7
Traffic count (AADT, yr)	7,000 (2011) (estimated)
Ground cover	Paved
Representative statistical area name	Las Vegas-Paradise MSA

Pollutant, POC	PM <sub>10</sub> , 1	O <sub>3</sub> , 1
Parameter code	81102	44201
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure
Monitor type(s)	SLAMS	SLAMS
Instrument manufacturer & model	Thermo FH62C14	API 400 series
Method code	EQPM-1102-150	EQQA-0992-087
FRM/FEM/ARM/other	FEM	FEM
Collecting agency	DAQ	DAQ

<b>Pollutant, POC</b>	<b>PM<sub>10</sub>, 1</b>	<b>O<sub>3</sub>, 1</b>
Analytical lab	NA	NA
Reporting agency	DAQ	DAQ
Spatial scale	Middle	Neighborhood
Monitoring start date	07/01/1998	07/01/1998
Current sampling frequency	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous
Sampling season	Year-round	Year-round
Probe height (m)	4.9	3.7
Distance from supporting structure (m)	2.3	1.4
Distance from obstructions on roof (m)	NA	NA
Distance from obstructions not on roof (m)	NA	NA
Distance from trees (m)	16.7	19.9
Distance to furnace or incinerator flue (m)	NA	NA
Distance between collocated monitors (m)	NA	NA
Unrestricted airflow (degrees)	360	360
Probe material for reactive gases	NA	Teflon
Residence time for reactive gases (s)	NA	6.8
Will there be changes within the next 18 months? (Y/N)	N	N
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA
Frequency of flow rate verification for automated PM analyzers	Biweekly	NA
Frequency of one-point QC check for gaseous instruments	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	06/18/2012
Last two semiannual flow rate audits for PM monitors	03/22/2012; 09/21/2012	NA

Meteorological measurements include wind speed, wind direction, ambient temperature, and barometric pressure.

**Figure 11: Paul Meyer.**



The primary objective of this site in southwest Las Vegas is to monitor O<sub>3</sub>, but it also monitors PM<sub>10</sub>. The topography is such that the summertime loft brings higher O<sub>3</sub> and precursor levels toward this site from the east end of the Las Vegas Valley.

Local Site Name (AQS ID)	Paul Meyer (32-003-0043)
GPS Coordinates (latitude, longitude)	+36.106389°, -115.253333°
Street Address	4525 New Forest Dr., Las Vegas, NV 89147
Distance to roadway (m)	102
Traffic count (AADT, yr)	5,000 (2011) (estimated)
Ground cover	Concrete, grass
Representative statistical area name	Las Vegas-Paradise MSA

Pollutant, POC	PM <sub>10</sub> , 1	O <sub>3</sub> , 1
Parameter code	81102	44201
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure
Monitor type(s)	SLAMS	SLAMS
Instrument manufacturer & model	Thermo FH62C14	API 400 series
Method code	EQPM-1102-150	EQOA-0992-087
FRM/FEM/ARM/other	FEM	FEM

<b>Pollutant, POC</b>	<b>PM<sub>10</sub>, 1</b>	<b>O<sub>3</sub>, 1</b>
Collecting agency	DAQ	DAQ
Analytical lab	NA	NA
Reporting agency	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood
Monitoring start date	01/01/1998	07/01/1998
Current sampling frequency	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous
Sampling season	Year-round	Year-round
Probe height (m)	6.3	4.0
Distance from supporting structure (m)	1.6	1.4
Distance from obstructions on roof (m)	NA	NA
Distance from obstructions not on roof (m)	NA	NA
Distance from trees (m)	17.1	21
Distance to furnace or incinerator flue (m)	NA	NA
Distance between collocated monitors (m)	NA	NA
Unrestricted airflow (degrees)	360	360
Probe material for reactive gases	NA	Teflon
Residence time for reactive gases (s)	NA	6.5
Will there be changes within the next 18 months? (Y/N)	N	N
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA
Frequency of flow rate verification for automated PM analyzers	Biweekly	NA
Frequency of one-point QC check for gaseous instruments	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	10/04/2012
Last two semiannual flow rate audits for PM monitors	06/28/2012; 11/27/2012	NA

Meteorological measurements include wind speed, wind direction, ambient temperature, and barometric pressure.

Figure 12: Sunrise Acres.



Monitoring at this site near the center of the Las Vegas Valley began as part of a CO study in the 1990s. All monitoring activities at the East Charleston site were transferred here when that lease was terminated. The site's primary objective is to monitor CO and PM; it monitors PM<sub>10</sub>, and it monitors PM<sub>2.5</sub> using both filter-based and continuous methodologies. It also serves as the primary and collocated sampling site for PM<sub>2.5</sub> FRM samplers.

Local Site Name (AQS ID)	Sunrise Acres (32-003-0561)
GPS Coordinates (latitude, longitude)	+36.163889°, -115.113889°
Street Address	2501 Sunrise Ave., Las Vegas, NV 89101
Distance to roadway (m)	128
Traffic count (AADT, yr)	3,000 (2013) (estimated)
Ground cover	Paved
Representative statistical area name	Las Vegas-Paradise MSA

Pollutant, POC	PM <sub>10</sub> , 1	CO, 1	PM <sub>2.5</sub> (FRM), 1	PM <sub>2.5</sub> FRM Collocated, 2	PM <sub>2.5</sub> (cont.), 3	NO <sub>2</sub> , 1
Parameter code	81102	42101	88101	88101	88101	42602
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Highest concentration	Highest concentration	Quality assurance	Highest concentration	Population exposure
Monitor type(s)	SLAMS	SLAMS	SLAMS	QA collocated	SLAMS	SLAMS
Instrument manufacturer & model	Thermo FH62C14	API 300 series	Thermo 2025i	Thermo 2025i	Thermo 5014i	API 200 series

Pollutant, POC	PM <sub>10</sub> , 1	CO, 1	PM <sub>2.5</sub> (FRM), 1	PM <sub>2.5</sub> FRM Collocated, 2	PM <sub>2.5</sub> (cont.), 3	NO <sub>2</sub> , 1
Method code	EQPM-1102-150	RFCA-1093-093	RFPS-0498-118	RFPS-0498-118	EQPM-0609-183	RFNA-1194-099
FRM/FEM/ARM/other	FEM	FRM	FRM	FRM	FEM	FRM
Collecting agency	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ
Analytical lab	NA	NA	Weigh	Weigh	NA	NA
Reporting agency	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	04/17/2004	10/01/1996	04/14/2004	04/14/2004	10/01/2012	01/01/2013
Current sampling frequency	Continuous	Continuous	1:3	1:6	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	1:3	1:6	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round
Probe height (m)	4.7	3.6	2.9	2.9	4.8	3.6
Distance from supporting structure (m)	2.2	1.2	2.1	2.1	2.3	1.2
Distance from obstructions on roof (m)	NA	NA	NA	NA	NA	NA
Distance from obstructions not on roof (m)	NA	NA	8	7	NA	NA
Distance from trees (m)	NA	NA	NA	NA	NA	NA
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA	NA	NA
Distance between collocated monitors (m)	3.0	NA	2.1	2.1	3.0	NA
Unrestricted airflow (degrees)	360	360	360	360	360	360
Probe material for reactive gases	NA	Teflon	NA	NA	NA	Teflon
Residence time for reactive gases (s)	NA	2.13	NA	NA	NA	3.1
Will there be changes within the next 18 months? (Y/N)	N	N	N	N	N	N
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	N	N	Y	Y	Y	N
Frequency of flow rate verification for manual PM samplers	NA	NA	Monthly	Monthly	NA	NA
Frequency of flow rate verification for automated PM analyzers	Biweekly	NA	NA	NA	Biweekly	NA
Frequency of one-point QC check for gaseous instruments	NA	Daily	NA	NA	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	09/25/2012	NA	NA	NA	None

<b>Pollutant, POC</b>	<b>PM<sub>10</sub>, 1</b>	<b>CO, 1</b>	<b>PM<sub>2.5</sub> (FRM), 1</b>	<b>PM<sub>2.5</sub> FRM Collocated, 2</b>	<b>PM<sub>2.5</sub> (cont.), 3</b>	<b>NO<sub>2</sub>, 1</b>
Last two semiannual flow rate audits for PM monitors	03/15/2012; 09/20/2012	NA	03/15/2012; 06/27/2012; 11/29/2012	03/15/2012; 11/29/2012	03/15/2012; 09/20/2012	NA

Meteorological measurements include wind speed, wind direction, and ambient temperature.

**Figure 13: Walter Johnson.**

The primary objective of this site on the west side of Las Vegas is to monitor O<sub>3</sub>. The topography is such that the summertime loft brings high O<sub>3</sub> and precursor levels towards this site from the east end of the Las Vegas Valley.

Local Site Name (AQS ID)	Walter Johnson (32-003-0071)
GPS Coordinates (latitude, longitude)	+36.169722°, -115.263056°
Street Address	7701 Ducharme Ave., Las Vegas, NV 89145
Distance to roadway (m)	13.0
Traffic count (AADT, yr)	7,100 (2011)
Ground cover	Concrete/asphalt, grass
Representative statistical area name	Las Vegas-Paradise MSA

<b>Pollutant, POC</b>	<b>O<sub>3</sub>, 1</b>
Parameter code	44201
Basic monitoring objective(s)	NAAQS comparison
Site type(s)	Population exposure
Monitor type(s)	SLAMS
Instrument manufacturer & model	API 400 series
Method code	EQOA-0992-087
FRM/FEM/ARM/other	FEM
Collecting agency	DAQ
Analytical lab	NA

Pollutant, POC	O <sub>3</sub> , 1
Reporting agency	DAQ
Spatial scale	Neighborhood
Monitoring start date	08/01/1998
Current sampling frequency	Continuous
Calculated sampling frequency	Continuous
Sampling season	Year-round
Probe height (m)	3.7
Distance from supporting structure (m)	1.4
Distance from obstructions on roof (m)	NA
Distance from obstructions not on roof (m)	18.4
Distance from trees (m)	16.5
Distance to furnace or incinerator flue (m)	NA
Distance between collocated monitors (m)	NA
Unrestricted airflow (degrees)	360
Probe material for reactive gases	Teflon
Residence time for reactive gases (s)	2.31
Will there be changes within the next 18 months? (Y/N)	N
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	N
Frequency of flow rate verification for manual PM samplers	NA
Frequency of flow rate verification for automated PM analyzers	NA
Frequency of one-point QC check for gaseous instruments	Daily
Last annual performance evaluation for gaseous parameters	03/26/2012
Last two semiannual flow rate audits for PM monitors	NA

**Figure 14: Winterwood.**

This site on the east side of Las Vegas is one of DAQ's oldest sites. Its primary objective is to monitor CO and O<sub>3</sub>, and it serves as an indicator for population exposure.

Local Site Name (AQS ID)	Winterwood (32-003-0538)
GPS Coordinates (latitude, longitude)	+36.143056°, -115.056389°
Street Address	5483 Club House Dr., Las Vegas, NV 89142
Distance to roadway (m)	42
Traffic count (AADT, yr)	400 (2013) (estimated)
Ground cover	Grass, paving, gravel
Representative statistical area name	Las Vegas-Paradise MSA

Pollutant, POC	CO, 1	O <sub>3</sub> , 2
Parameter code	42101	44201
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure
Monitor type(s)	SLAMS	SLAMS
Instrument manufacturer & model	API 300 series	API 400 series
Method code	RFCA-1093-093	EQOA-0992-087
FRM/FEM/ARM/other	FRM	FEM
Collecting agency	DAQ	DAQ
Analytical lab	NA	NA

<b>Pollutant, POC</b>	<b>CO, 1</b>	<b>O<sub>3</sub>, 2</b>
Reporting agency	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood
Monitoring start date	01/01/1998	07/01/1979
Current sampling frequency	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous
Sampling season	Year-round	Year-round
Probe height (m)	3.9	3.9
Distance from supporting structure (m)	1.2	1.2
Distance from obstructions on roof (m)	NA	NA
Distance from obstructions not on roof (m)	2.5	2.5
Distance from trees (m)	26.4	26.4
Distance to furnace or incinerator flue (m)	NA	NA
Distance between collocated monitors (m)	NA	NA
Unrestricted airflow (degrees)	360	360
Probe material for reactive gases	Teflon	Teflon
Residence time for reactive gases (s)	3.5	3.0
Will there be changes within the next 18 months? (Y/N)	N	N
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA
Frequency of flow rate verification for automated PM analyzers	NA	NA
Frequency of one-point QC check for gaseous instruments	Daily	Daily
Last annual performance evaluation for gaseous parameters	03/30/2012	03/26/2012
Last two semiannual flow rate audits for PM monitors	NA	NA

For all gaseous monitoring operations, a two-point (zero/span) QC check is conducted daily and a three-point (zero/precision/span) QC check is conducted weekly.

Section 5: Maps of Criteria Pollutant Monitoring Stations in 2012

Figure 15: CO Monitors.

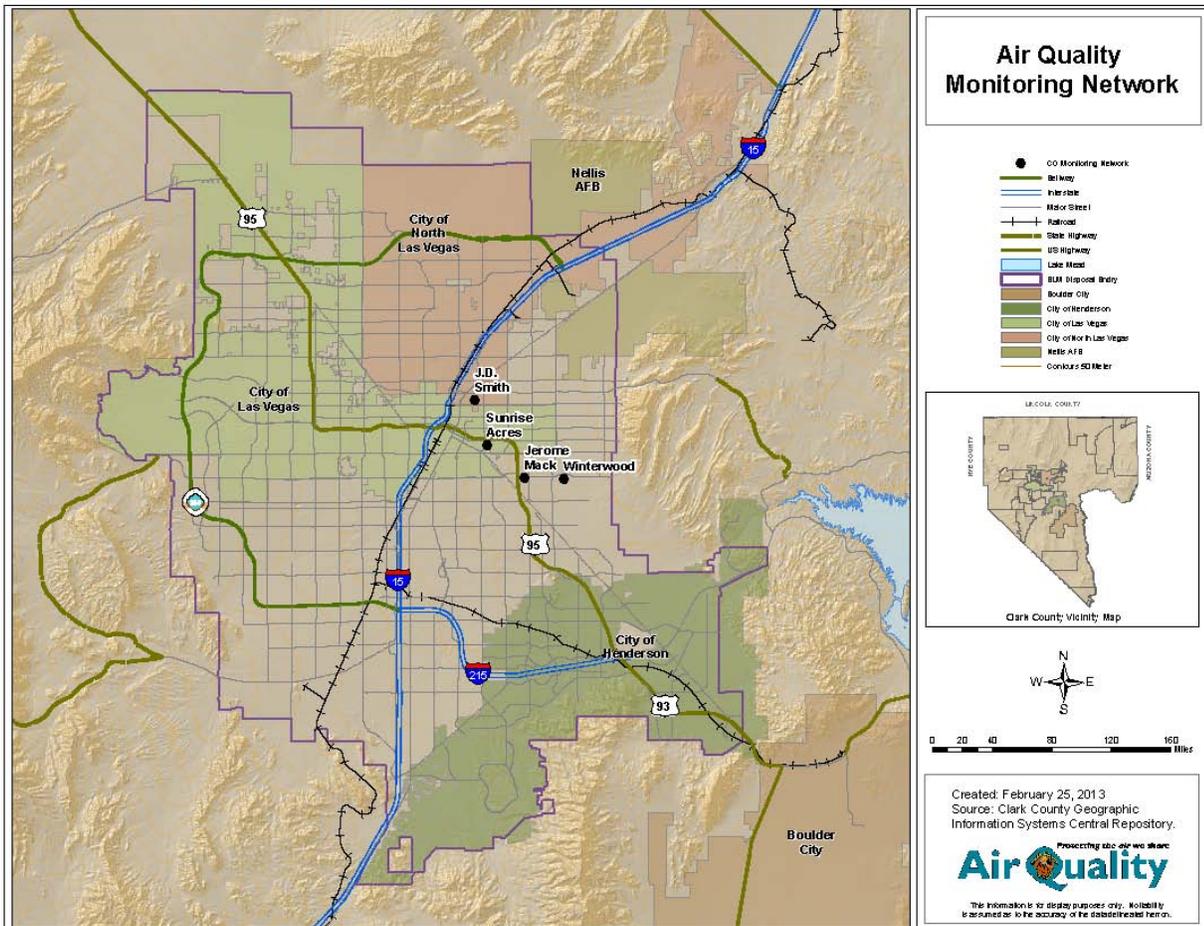


Figure 16: O<sub>3</sub> Monitors.

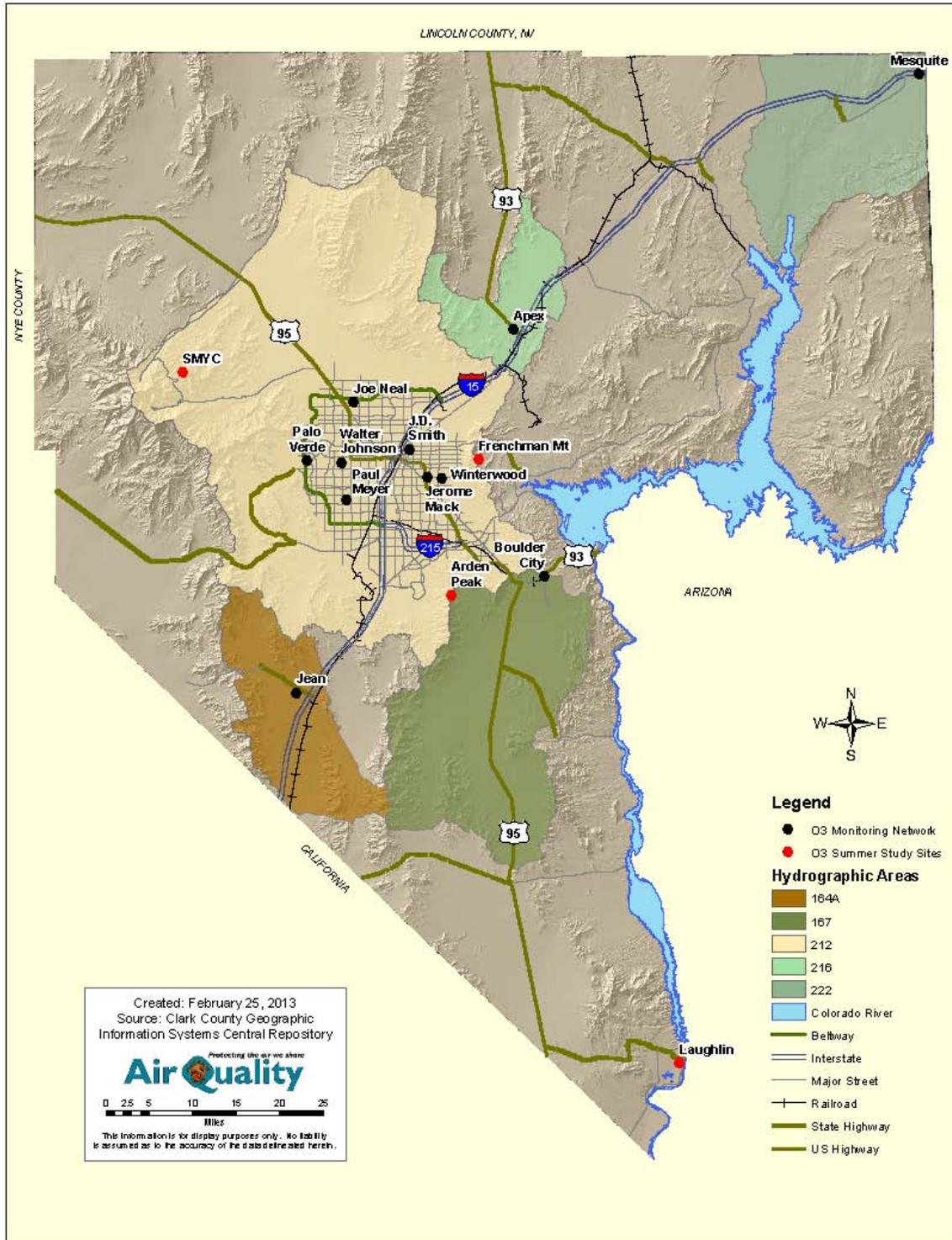


Figure 17: NO<sub>x</sub> Monitors.

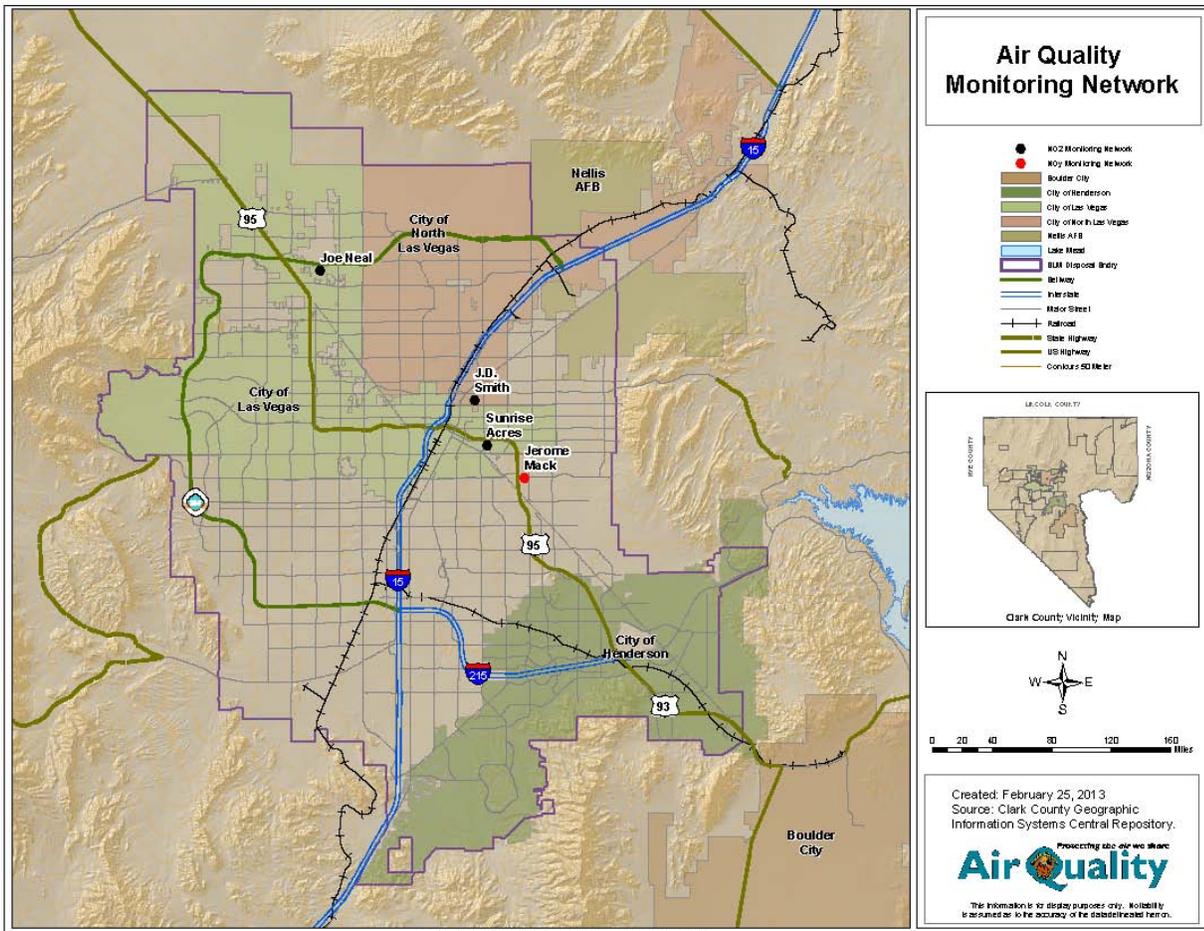


Figure 18: SO<sub>2</sub> Monitors.

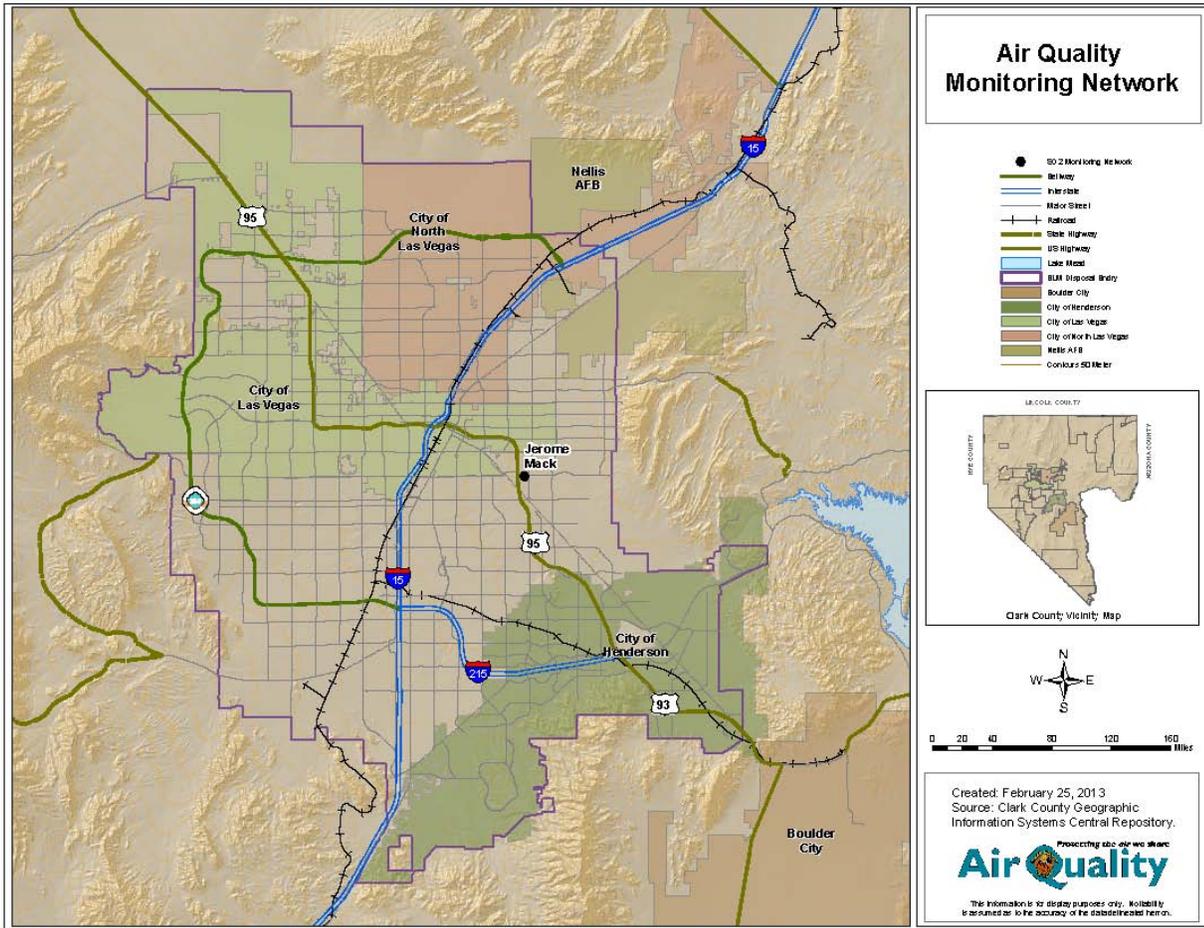


Figure 19: Continuous PM<sub>10</sub> Monitors.

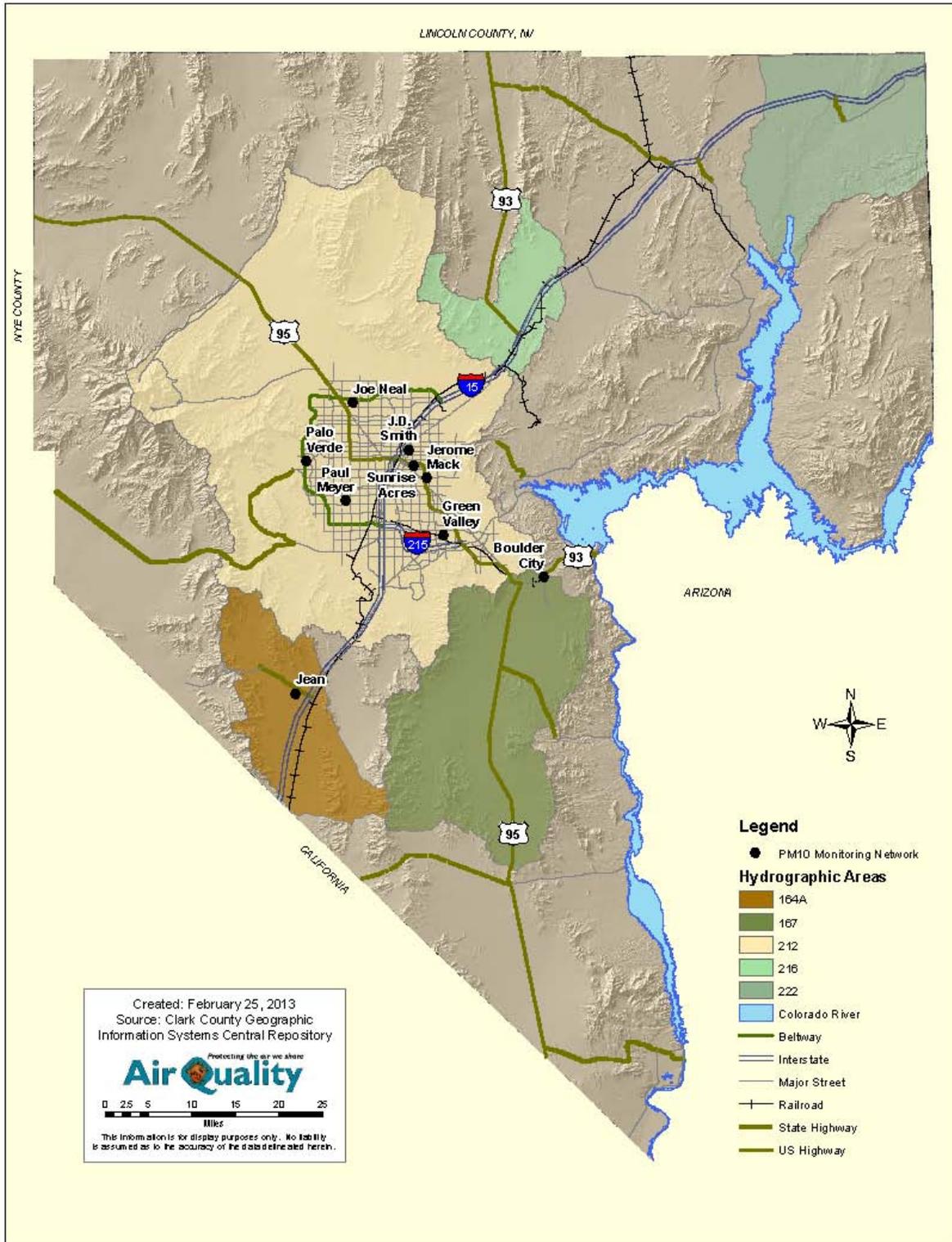


Figure 20: Continuous PM<sub>2.5</sub> Monitors.

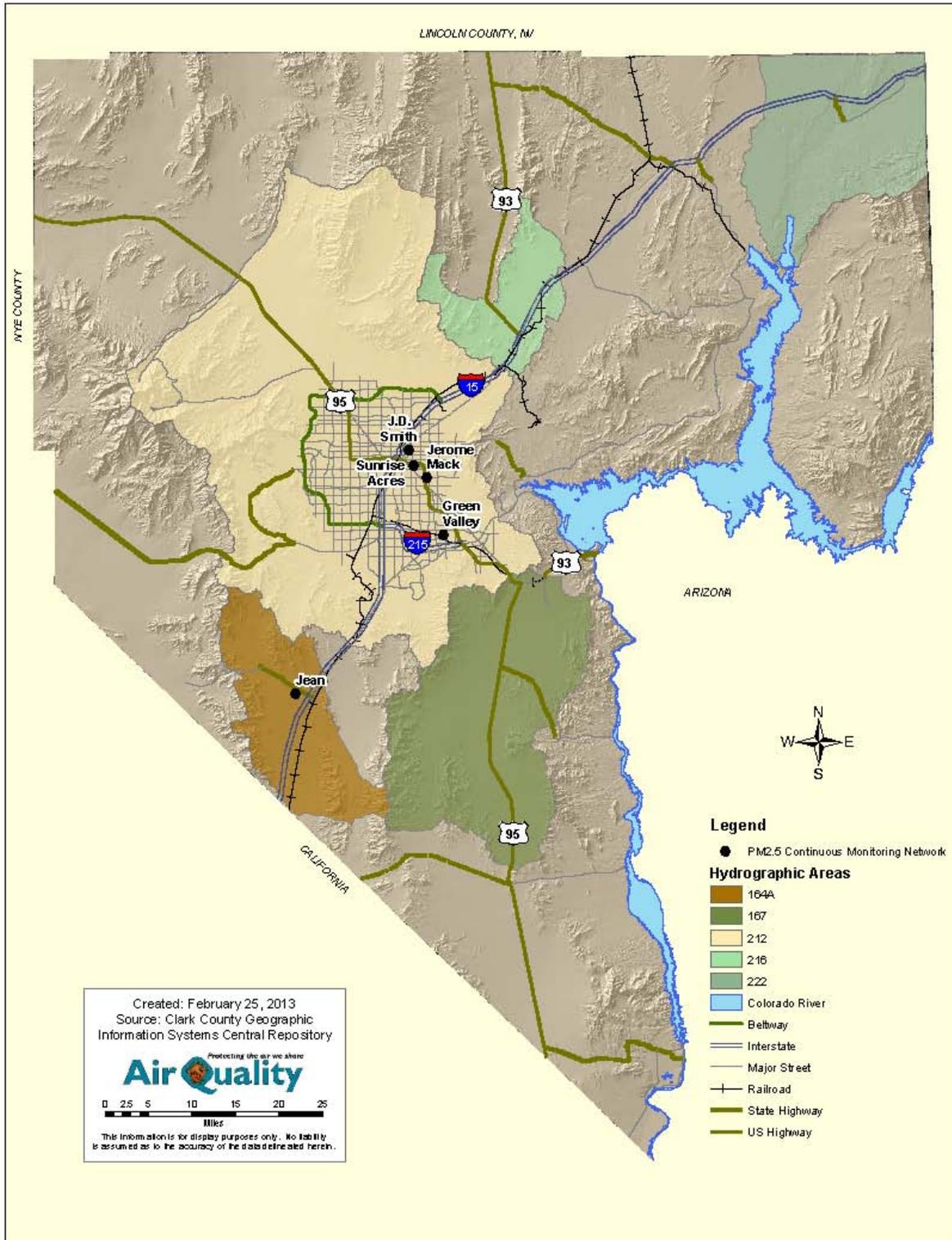
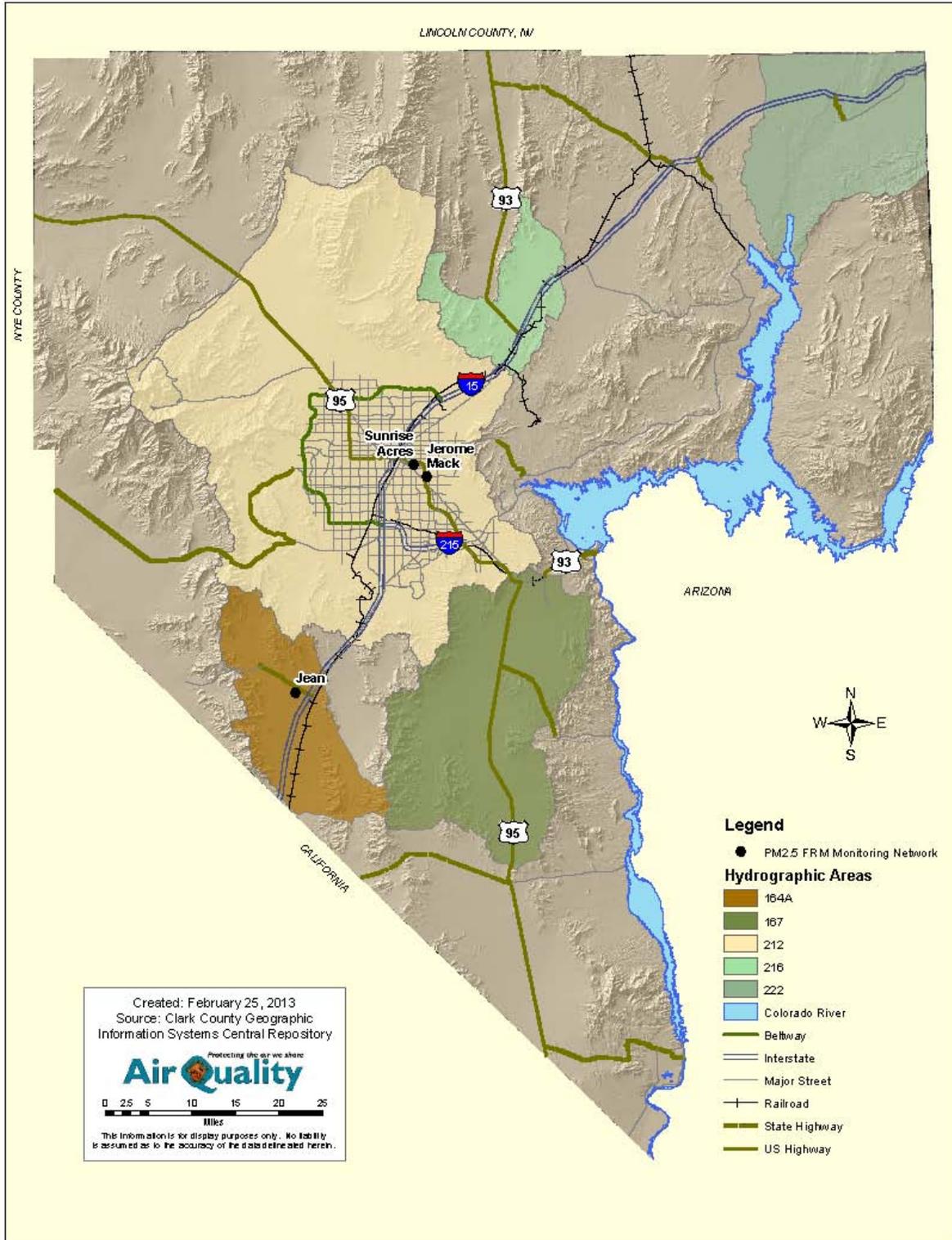


Figure 21: Filter-Based PM<sub>2.5</sub> Sampler.



## Section 6: National Performance Audit and Performance Evaluation Programs

Each year, EPA Region 9 contracts for the National Performance Audit Program (NPAP) Through-the-Probe (TTP) performance evaluation, which focuses on gaseous criteria pollutants. DAQ received a “Pass” on all NPAP and TTP performance evaluations in 2012.

Table 10. 2012 NPAP and TTP Evaluations

Monitoring Station	Pollutant	Evaluation Date
Boulder City	O <sub>3</sub>	4/18
Jean	O <sub>3</sub>	4/18
Mesquite	O <sub>3</sub>	4/19
Apex	O <sub>3</sub>	4/19

Each year, the PM<sub>2.5</sub> FRM sampling network undergoes a Performance Evaluation Program (PEP) audit. PEP audit results (in µg/m<sup>3</sup>) are generated and submitted to the AQS database.

Table 11. 2012 PEP Audit Activity

Sampler Location	Pollutant	Audit Date
Sunrise Acres, Jerome Mack	PM <sub>2.5</sub> (FRM)	1/19
Sunrise Acres, Jean	PM <sub>2.5</sub> (FRM)	4/12
Jerome Mack	PM <sub>2.5</sub> (FRM)	7/17
Jean	PM <sub>2.5</sub> (FRM)	10/12

## Section 7: Network Modifications

### 7.1 Completed Changes

DAQ has made the following network changes.

Table 12. Summary of 2012 Network Modifications

Action	Date	Explanation
Replaced low volume PM <sub>10</sub> Pb sampling with high volume TSP Pb sampling	07/01/2012	Per EPA guidance
Replaced continuous PM <sub>2.5</sub> monitor at Sunrise Acres	10/01/2012	Upgraded from non-designated PM <sub>2.5</sub> to PM <sub>2.5</sub> FEM
Replaced continuous PM <sub>2.5</sub> monitor at JD Smith	01/01/2013	Upgraded from non-designated PM <sub>2.5</sub> to PM <sub>2.5</sub> FEM
Added NO <sub>2</sub> monitoring at Sunrise Acres	01/01/2013	To meet RA40 requirements

### 7.2 Proposed Changes

This section, which describes anticipated and potential changes to the monitoring network over the next two years, constitutes Clark County's official request to Region 9 for approval of proposed changes.

DAQ proposes changing the speciation parameters' site type at Jerome Mack from highest concentration to population exposure.

Table 13. Proposed Site and Equipment Terminations, 2012–2014

Site/Equipment Termination	Date	Explanation
Green Valley site	To be determined	Unresolved lease issues
Additional site closures	To be determined	Sites closed because of resource limitations

Table 14. Proposed Site and Equipment Installations, 2012–2014

Site/Equipment Installation	Date	Explanation
Near-road NO <sub>2</sub>	To be determined	Required by 40 CFR 58, Appendix D
Near-road NO <sub>2</sub> at City Center (interim near-road monitoring location)	January 2014	Required by 40 CFR 58, Appendix D
Apex Sonic Detection and Ranging	To be determined	Upper-air winds assessment

### 7.3 Review Process for Network Modifications

The annual network plan outlines all notices of proposed changes, in compliance with 40 CFR 58.10 (a)(2). DAQ will provide time for a public review when a violating monitor is being discontinued, or when proposing to reduce any SLAMS monitoring. DAQ will post all notices and documents for public review on its Web site.

## 7.4 Near-road Monitoring

In March 2013, EPA revised 40 CFR 58 to extend the deadline for commencement of near-road NO<sub>2</sub> monitoring to January 1, 2014. After investigating different locations, using guidance in EPA's June 2012 *Near-Road Technical Assistance Document (TAD)*, DAQ identified a suitable location at the southeast side of the intersection between Rancho Drive and Teddy Drive. DAQ is trying to acquire this location to set up a near-road monitoring station; however, since right-of-way issues and related construction may delay this process more than a fiscal year, DAQ proposes the City Center (AQS 32-003-0016) site as an interim location. It sits in one of the valley's highest traffic areas, where traffic is congested at least twice per day. Predominant wind flow brings transport from the resort corridors on I-15 and South Las Vegas Boulevard (Las Vegas Strip) here, as well as roadside emissions from U.S. Highway 95. Since the site is within 50 m of U.S. 95, it may also be suitable for microscale monitoring; a previous study determined that O<sub>3</sub> was undergoing titration by NO<sub>x</sub> from vehicles on U.S. 95. City Center also has the flexibility to qualify for neighborhood-scale monitoring.

40 CFR 58.13 requires one CO monitor to be placed at the near-road site. DAQ anticipates having a monitor operational by January 1, 2017, as required.

EPA will require near-road PM<sub>2.5</sub> monitoring beginning January 1, 2017 (vol. 78, p. 10 of the *Federal Register*). DAQ anticipates having a monitor operational by January 1, 2017, as required.

## 7.5 Special Purpose Sites

*Spring Mountain Youth Camp O<sub>3</sub> Research Site.* On May 10, 2010, DAQ installed a new Special Purpose Monitor<sup>1</sup> (SPM) at the Spring Mountain Youth Camp to provide periodic O<sub>3</sub> data needed to further its research on transport corridors in Clark County and to validate its modeling methodology. DAQ has always designated this monitor as SPM, and coded it that way in the AQS.<sup>2</sup> It has operated the SPM at this site at different intervals expressly to collect research data; the last time was in September 2012.

Since the collection of proprietary research data was DAQ's sole purpose in establishing the Spring Mountain site, it has never used that SPM to show minimum regulatory compliance pursuant to 40 CFR 58. Furthermore, DAQ has never used either FRM or FEM when collecting SPM data at the Spring Mountain Youth Camp site.<sup>3</sup> Although the SPM at this site was approved to apply FEM to monitor ozone, data was never collected using FEM.

One of the primary FEM requirements is to comply with the testing procedure for the specific pollutant<sup>4</sup>: for O<sub>3</sub>, the set-up and start-up of the test analyzer, test samplers, and reference method must be in strict accordance with the manufacturer's operation manuals.<sup>5</sup> The regulation leaves no room for even minor deviation from the manual's specifications.<sup>6</sup>

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<sup>1</sup> Teledyne API Model 400E, Serial No. 1980.

<sup>2</sup> See AQS entry designating the monitors as SPM on May 5, 2010. Monitor Comment in the AQS indicated that the Spring Mountain Youth Camp was a 2010 smoke study site for ozone.

<sup>3</sup> 40 CFR 58.20(a).

<sup>4</sup> 40 CFR 53.3(b).

<sup>5</sup> 40 CFR 53.32(d)(1).

<sup>6</sup> 40 CFR 53.32(d)(1), which mandates strict compliance rather than substantial compliance.

The SPM at the Spring Mountain Youth Camp operated substantially outside the specification range and allowable tolerance provided in the operating manual.<sup>7</sup> For example, the altitude for the SPM at this site is 569 m higher than the highest possible range allowable for the Teledyne API Model 400E to provide data using FEM.<sup>8</sup> This deviation was planned: DAQ chose this research site as a transport-source, high-concentration ozone area precisely for its high elevation, among other factors. In addition, the pressure ranges of this SPM site are predictably out of the monitor's specified range; according to the operating manual, the acceptable range for pressure level is 25-31, but the recorded pressure range at this site is 20.7. The flow rate was predictably affected: although the allowable tolerance level for an SPM is 10 percent within 800 cc/min., the actual flow rate recorded for the SPM at this site is 619-637 cc/min., substantially outside the acceptable tolerance level. Therefore, the data from the SPM at the Spring Mountain Youth Camp can never be collected using FEM.

DAQ operated the SPM in the Spring Mountain Youth Camp site intermittently between May 2010 and September 2012, nor for 24 consecutive months. Unlike much of the country, Nevada's ozone season lasts year-round.<sup>9</sup> But the SPM at Spring Mountain Youth Camp operated only during the summer months, pursuant to its research objective, so it cannot provide 24 months of O<sub>3</sub> data.

Because the SPM O<sub>3</sub> data were not collected using any federally approved method<sup>10</sup>, DAQ did not deem it necessary to comply with 40 CFR 58.11, 58.12, Appendix A, or Appendix E.<sup>11</sup> Accordingly, DAQ did not follow the auditing and other quality control procedures for an SPM mandated by these regulatory provisions. However, it voluntarily submitted the SPM data to EPA's Air Quality System (AQS) database<sup>12</sup>, seeking to contribute to the evolving science of air quality. DAQ has funded its own research with the objective of contributing to the goals of the Clean Air Act, and would like to continue researching high elevation sites that are not necessarily part of a regulatory monitoring network.

The tables below summarize DAQ's summer O<sub>3</sub> site information.

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<sup>7</sup> 04315 Rev. C, M 400E Ozone Analyzer Operator's Manual: Basic Unit Specification

<sup>8</sup> Id which provides that altitude range for the placement for the monitor in Spring Mountain Youth Camp to be 0-2000 M in order to collect data using FEM.

<sup>9</sup> 40 CFR 58, Appendix D.

<sup>10</sup> 40 CFR 58.20(a).

<sup>11</sup> 40 CFR 58.20(b): It is a threshold question whether data were collected using FEM.

<sup>12</sup> 40 CFR 58.20(b).

Table 15. Spring Mountain Youth Camp

Local Site Name (AQS ID)	SM Youth Camp (32-003-7771)
GPS Coordinates (latitude, longitude)	+36.318889°, -115.585278°
Representative statistical area name	Las Vegas-Paradise MSA
Pollutant	O <sub>3</sub>
Parameter code	44201
Method code	EQOA-0992-087
Sampling frequency	Continuous, seasonal
Sampling season	04/01-09/30
Basic monitoring objective(s)	Research support
Site type(s)	Regional transport
Monitor type(s)	Special purpose

Table 16. Arden Peak

Local Site Name (AQS ID)	Arden Peak, (32-003-7778)
GPS Coordinates (latitude, longitude)	+35.945833°, -115.042778°
Representative statistical area name	Las Vegas-Paradise MSA
Pollutant	O <sub>3</sub>
Parameter code	44201
Method code	EQOA-0992-087
Sampling frequency	Continuous, seasonal
Sampling season	04/01-09/30
Basic monitoring objective(s)	Research support
Site type(s)	Regional transport
Monitor type(s)	Special purpose

Table 17. Frenchman Mountain

Local Site Name (AQS ID)	Frenchman Mountain (32-003-7774)
GPS Coordinates (latitude, longitude)	+36.176944°, -114.998611°
Representative statistical area name	Las Vegas-Paradise MSA
Pollutant	O <sub>3</sub>
Parameter code	44201
Method code	EQOA-0992-087
Sampling frequency	Continuous, seasonal
Sampling season	04/01-09/30
Basic monitoring objective(s)	Research support
Site type(s)	Regional transport
Monitor type(s)	Special purpose

Table 18. Laughlin

Local Site Name (AQS ID)	Laughlin (32-003-7779)
GPS Coordinates (latitude, longitude)	+35.169444°, -114.579444°
Representative statistical area name	Las Vegas-Paradise MSA
Pollutant	O <sub>3</sub>
Parameter code	44201
Method code	EQOA-0992-087
Sampling frequency	Continuous, seasonal
Sampling season	04/01-09/30
Basic monitoring objective(s)	Research support
Site type(s)	Regional transport
Monitor type(s)	Special purpose

At the request of EPA's Office of Air Quality Planning and Standards, DAQ is taking part in the Sunset Organic Carbon/Elemental Carbon Evaluation Project. A semi-continuous carbon sampler has been installed at the Jerome Mack NCore station and is expected to run for three years. DAQ is now awaiting protocols from EPA to load related data into AQS.

## 7.6 Future Needs

Through special studies, modeling, forecasting, and a network assessment, DAQ has projected spatial gaps and high pollutant concentrations in specific areas of Clark County. We have identified potential monitoring sites in Indian Springs, Coyote Springs, Primm, Logandale, the north-central and southwest areas of the Las Vegas Valley, and mountain ranges surrounding the valley.