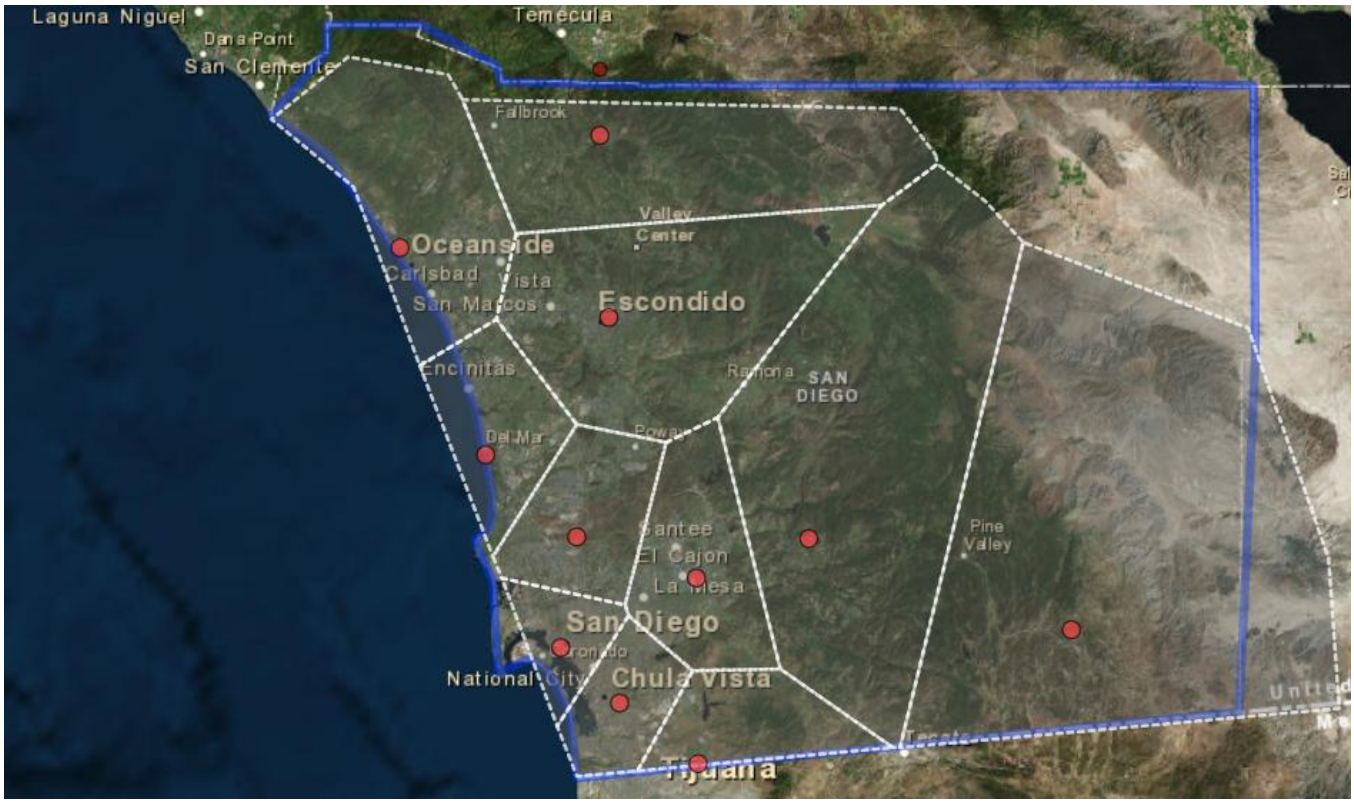
MONITORING AND TECHNICAL SERVICES DIVISION

5-YEAR AIR QUALITY MONITORING NETWORK ASSESSMENT 2015

JULY, 2015



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ACRONYMS

Symbols & Numbers

>- Greater than
<- Less than
≥- Greater than or equal to
≤- Less than or equal to
%- percent
$\mu g/m^3$- micrograms per cubic meter
7/24- Monitor that operates 7 days a week, 24 hours a day

A

AADT- Average Actual Daily Traffic
Acid Rain- Rain which is especially acidic, which typically is composed of sulfuric and/or nitric acid. Formed by the combination of nitrogen and sulfur oxides with water vapor in the atmosphere.
Aerosol- Particles of solid or liquid matter that can remain suspended in air for long periods of time because of extremely small size and/or weight.
Area wide- Stationary sources of pollution
Attainment Area; a geographic area which is in compliance with the NAAQS
Air Explorer- AQS data analysis tool
AirNow- AQI real time data
ALP- Alpine monitoring location
AMP reports- Series of AQS retrieval reports
AMTIC- Ambient Monitoring Technical Information Center
APCD- Air Pollution Control District; a county agency with authority to regulate sources of air pollution within the county and governed by the county supervisors.
AQI- Air Quality Index
AQMD- Air Quality Management District; a group of counties or an individual county with authority to regulate sources of air pollution within the region and governed by a regional air pollution control board.
AQS- Air Quality System
ARM- Approved Regional Method
Automated (aka continuous)- A sampler that operates on a 7/24 schedule

B

BAM- Beta Attenuation Monitor
BURN- Agricultural Burning refers to the intentional use of fire for the burning of vegetation produced wholly from the growing and harvesting of crops in agricultural operations. This includes the burning of grass and weeds in fence rows, ditch banks, and berms in non-tillage orchard operations, fields being prepared for cultivation, agricultural wastes, and the operation or maintenance of a system for the delivery of water for agricultural operations.

C

CAA- Clean Air Act
CARB- California Air Resources Board
CASAC- Clean Air Science Advisory Committee

CASTNET- Clean Air Status and Trends Network
CA TAC- California Air Toxics monitoring
CBSA- Core Bases Statistical Area
CFR- Code of Federal Regulations
CL- Chemiluminescence method is based upon the emission of photons in the reaction between ozone and nitric oxide (NO) to form nitrogen dioxide and oxygen.
CMP- Camp Pendleton monitoring location
CO- Carbon monoxide
CO_2- Carbon dioxide
Collocated- a monitor/sampler that is located within 1-4 meters, depending on the sampling rate of another one of the same sampling method.
Continuous (aka automated)- A sampler that operates on a 7/24 schedule
Criteria pollutants- An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set.
CRQ- McClellan-Palomar Airport monitoring location
CSA- Core based Statistical Area
Cr(VI) (aka Cr^{+6})- Chromium 6
CSN- Monitors that are part of the Chemical Speciation Network (carbon analyses)
CT- Low volume, continuous sampler, size selective inlet method is based upon a regulated low flow (16.7 LPM) instrument that operates 7 / 24.
CVA- Chula Vista monitoring location

D
DVN- Donovan monitoring station
DMR- Del Mar monitoring station
DNPH- 2,4 –dinitrophenyl hydrazine; a derivatizing agent on cartridges used to collect carbonyl samples
DTN- San Diego/Beardsley St. monitoring location

E
EIR- Environmental Impact Report
EC- Elemental Carbon
ECA- El Cajon monitoring station
EPA- Environmental Protection Agency
ESC- Escondido monitoring station
EXDN- Extreme downwind site type

F
FDMS- Filter Dynamic Measurement System
FE- Fleet equivalency
FEM- Federal Equivalent Method
FIP- Federal Implementation Plan
FL- Fluorescence method is based upon the principle that SO_2 molecules absorb ultraviolet (UV) light and become excited at one wavelength, then decay to a lower energy state emitting UV light at a different wavelength. The intensity of fluorescence is proportional to the SO2 concentration.
FR- Federal Register
FRM- Federal Reference Method
FSL- Fused silica lined

G

G/B- General/Background site type
GC/FID- Gas Chromatography with a flam ionization detector
GC/MS- Gas Chromatography followed by mass spectroscopy

H

HAP- Hazardous Air Pollutant; An air pollutant considered by the EPA to be particular hazardous to health.
HC- Highest concentration site type
HD- High density
HPLC- High Performance Liquid Chromatography
Hr- Hour
Hydrocarbon- Any of a large number of compounds containing various combinations of hydrogen and carbon atoms.

I

ICP/MS- Inductively Coupled Plasma Mass Spectrometry
IMPROVE- Interagency Monitoring of Protected Visual Environments
IO- Inorganic
IR- Nondispersive infrared method is based upon the absorption of infrared radiation by CO in a non-dispersive photometer. Infrared energy from a source is passed through a cell containing the gas sample to be analyzed, and the quantitative absorption of energy by CO in the sample cell is measured by a suitable detector.

K

KMA- San Diego/Overland (aka Kearny Mesa) monitoring location
KVR- Kearny Villa Road monitoring location

L

Lat- Latitude
Level I calibrator- A calibrator that is certified according to EPA specifications
Level II- calibrator- A calibrator that is not certified
Lon- Longitude

M

Manual (aka sequential)- A sampler that requires a media change and operates on a schedule set by the EPA.
MDL- Method Detection Limit
Met- Meteorological
MI- Microscale is an expanse of uniform pollutant concentrations, ranging from several meters up to 100m.
MOA- Memorandum of Agreement
Mobile Sources- Sources of air pollution that are not stationary, e.g. automobiles.
Monitoring- The periodic or continuous sampling and analysis of air pollutants in ambient air or from individual pollutant sources.
MOU- Memorandum of Understanding
MS- Middle Scale is an expanse of uniform pollutant concentrations, ranging from about 100 meters to 0.5 kilometers

MSA- Metropolitan Statistical Area
MXO- Maximum ozone concentration site type
MXP- Maximum ozone precursor site type

N

NAAQS- National Ambient Qir Quality Standard
NACAA- National Association of Clean Air Agencies
NAFTA- North American Trade Agreement
NAMS- National Air Monitoring Station
NATA- National Air Toxics Assessment
NATTS- National Air Toxics Trends Sites
NCore- National Core multipollutant monitoring stations
NEI- National Emissions Inventory
NEPA- non-EPA Federal monitor type
NIST- National Institute of Standards and Technology
NOAA- National Oceanic and Atmospheric Administration
Non-Methane Hydrocarbons- (aka ROGs); a chemical gas composed of hydrocarbons that may contribute to the formation of smog.
NOx- Oxides of Nitrogen
NO- Nitric oxide
NO_2- Nitrogen dioxide
NOy- Reactive oxides of nitrogen
NPAP- National Performance Audit Program
NPEP- National Performance Evaluation Program
NPS- National Parks Service
NS- Neighborhood Scale is an expanse with dimensions, ranging in the 0.5 kilometer to 4.0 kilometer range.
NSR- New Source Review; a program used in development of permits for modifying industrial facilities which are in a non-attainment area.
Non-Attainment Area- A geographic area identified by the EPA as not meeting the NAAQS for a given pollutant.
NTIS- National Technical Information Service

O

OAQPS- Office of Air Quality Planning and Standards
OC- Organic Carbon
OTAQ- Office of Transportation and Air Quality
OTM- Otay Mesa monitoring location
O_3- Ozone
Ozone layer- A layer of ozone 12-15 miles above the earth's surface which helps to filter out harmful UV rays from the sun.
Ozone ground level- Exists at the earth's surface and is a harmful component of smog.
Ozone precursors- Chemicals, such as hydrocarbons, occurring naturally or anthropogenic, which contribute to the formation of ozone.

P

P&A- Precision and Accuracy
PAH- Polynuclear Aromatic Hydrocarbon

PAMS- Photochemical Assessment Monitoring Stations
PAMS Type I- Designation for areas which are subjected to overwhelming incoming transport of ozone. Located in the predominant morning upwind direction from the area of maximum precursor emissions (upwind and background). Typically located near the upwind edge of the photochemical grid model domain .
PAMS Type II- Designation for areas immediately downwind of the area of maximum precursor Emissions (maximum precursor emissions impact) and are placed near the downwind boundary of the central business district or primary area of precursor emissions mix.
PAMS Type III- Maximum ozone concentrations occurring downwind for the area of maximum precursor emissions. Typically these sites are located 10-30 miles from the fringe of the urban area.
Pb- Lead
PE- Population exposure site type
PEP- Performance Evaluation Program
Photochemical reaction- A term referring to chemical reactions brought about by the light energy of the sun.
PM- Particulate Matter
PMcoarse- (aka PMc or $PM_{10-2.5}$) the resultant particles of the subtraction of $PM_{2.5}$ from PM_{10}. Coarse particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
$PM_{2.5}$- An air pollutant of particle size of 2.5 micrometers or less, which is inhalable.
PM_{10}- An air pollutant of particle size of 10 micrometers or less, which is inhalable.
POC- Parameter Occurrence Code
ppb- Parts per billion
ppm- Parts per million
ppt- Parts per trillion
PQAO- Primary Quality Assurance Organization
PWEI- Populated Weighted Emissions Index
%RH- Relative humidity

Q

QA- Quality Assurance and Quality Assurance site type
QAC- Quality Assurance Collocated monitor type
QAPP- Quality Assurance Project Plan
QC- Quality Control
QIP- Quality Improvement Plan
QMP- Quality Management Plan
Qtr- Quarter

R

RASS- Radar Acoustic Sounding System
ROG- Reactive Organic Gas (aka non-Methane hydrocarbons); a chemical gas composed of hydrocarbons that may contribute to the formation of smog.
RT- Regional transport site type
RTI- Research Triangle Institute
RTP- Research Triangle Park

S

SDAB- San Diego Air Basin
SEE- Gillespie Field monitoring location
SI- High volume, manual, size selective method is based upon a regulated high flow (>200 LPM) instrument that operates on a set schedule.
SIP(M)- State Implementation Plan
SLAMS- State/Local Air Monitoring Station
S/L/T- State, Local, and Tribal agencies
Smog- A combination of smoke, ozone, hydrocarbons, nitrogen oxides, and other chemically reactive compounds, which can result in a murky brown haze, which has adverse health effects.
SMP- System Management Plan
Speciation- Collection of a $PM_{2.5}$ sample that has its composition analyzed
SO- Source oriented site type
SOP- Standard Operating Procedures
SO_2- Sulfur dioxide
SOW- Statement of Work
SP- Low volume, speciated method is based upon a regulated low flow (< 200 LPM) instrument that operates on a set schedule.
SPM- Special Purpose monitor type
SQ- Low volume, sequential, size selective inlet method is based upon a regulated low flow (< 200 LPM) instrument that operates on a set schedule.
STN- Monitors that are part of the Speciation Trends Network (ions and wood smoke)
STAG- State Air Grand (federal)
SU- Supplemental Speciation

T

TA- Trend Analysis monitoring is useful for comparing and analyzing air pollution concentrations over time. Trend analyses show the progress (or lack of progress) in improving air quality for an area over a period of years.
TAC- Toxic Air Contaminant
TAD- Technical Assistance Document
TLE- Trace Level
Toxics (aka Air Toxics)- A generic term referring to a harmful chemical or group of chemicals in the air that are especially harmful to health.
Toxic Hot Spot- An area where the concentration of air toxics is at a level where individuals may be exposed to an elevated risk of adverse health effects.
TTN- Technology Transfer Network

TR- Pollutant Transport is the movement of a pollutant between air basins. Transport monitoring is used to help determine whether observed pollutant concentrations are locally generated or generated outside of the air basin and blown ("transported") in, thereby raising local ambient air pollutant concentrations.
Trends- STN or CSN monitor type
TSP- Total Suspended Particulate

U

UNPAMS- Unofficial PAMS monitor type

UPBD- Upwind background

US- Urban Scale is Citywide pollutant conditions with dimensions ranging from 4 to 50 kilometers.

UV- Ultraviolet Absorption method is based upon the absorption of UV light by the ozone molecule and subsequent use of photometry to measure reduction of light at 254 nm, as expressed by the Beer-Lambert Law.

V

VOC- Volatile Organic Compounds

W

WD- Wind Direction

WF- Welfare Effects monitoring is used to measure air pollution impacts on visibility, vegetation damage, architectural damage, or other welfare-based impacts.

WS- Wind Speed

Y

Yr- Year

Z

ZAG- Zero Air Generator

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Introduction

Purpose of the Network Assessment

Monitoring networks are designed to achieve, with limited resources, the best possible scientific data to inform the protection of public health, the environment and public welfare. The number, location, and types of monitors needed to achieve this goal depends on a myriad of factors, including demographics, pollution levels, air quality standards, technology, budgets, and scientific understanding. These factors all change over time. In accordance with EPA monitoring regulations, each State and local air pollution control agency must conduct an assessment of its monitoring network every five years in order to determine the following:

- if the network meets the monitoring objectives defined in Appendix D of 40 CFR 58.10,
- whether new monitoring sites are needed,
- whether existing sites are no longer needed and can be terminated, and
- whether new technologies are appropriate for incorporation into the ambient air monitoring network.

On October 12, 2006, the United States (U.S.) Environmental Protection Agency (EPA) finalized an amendment to the ambient air monitoring regulations. As part of this amendment, the EPA added the following requirement for State, or where applicable local, monitoring agencies to conduct network assessments once every five years [40 CFR 58.10(e)].

> *"(e) The State, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For PM2.5, the assessment also must identify needed changes to population-oriented sites. The State, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The first assessment is due July 1, 2010."*

Ambient air monitoring objectives can shift over time, which is one of the major reasons behind the re-evaluation and reconfiguration of many monitoring networks. The alteration of a monitoring network can be initiated for several reasons. These reasons are:

- In response to a change in air quality. Air quality has changed since the adoption of the Clean Air Act (CAA) and National Ambient Air Quality Standards (NAAQS). For example, the ambient concentrations of lead have dropped radically compared to past levels in the U.S.
- A change in population and behaviors. For example, the U.S. population has grown, aged and shifted toward more urban and suburban areas over the past few decades. In addition, the rates of vehicle ownership and annual miles driven have also risen.
- The establishment of new air quality objectives. New programs and rules are constantly being instituted, including rules that will reduce air pollution.

- The result of an improved understanding of air quality issues, as well as improved monitoring capabilities. Together, the enhanced understanding and capabilities can be used to design more effective air monitoring networks.

As a result of such changes, the San Diego Air Pollution Control District's (District) air monitoring network may have unnecessary or redundant monitors, or ineffective and inefficient monitoring locations for some pollutants, while other areas or pollutants may have a lack of monitors (an air pollution monitoring gap). This assessment will assist the District in optimizing the current network to help better protect today's population and environment, while maintaining the ability to understand long-term historical air quality trends. In addition, the advantages of implementing new air monitoring technologies combined with an improved scientific understanding of air quality issues would greatly benefit the District's network, as well as the stakeholders, scientists, and general public who use it.

Scope of the Network Assessment

The network assessment must consider the ability of existing and proposed monitoring sites to provide relevant data for air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma). The assessment also must show the effects of proposals to discontinue any sites on data users other than the agency itself, such as nearby States and Tribes or organizations conducting studies on health effects. For the criteria pollutant $PM_{2.5}$, the assessment also must identify needed changes to population-oriented sites.

The objectives for this network assessment are three-fold:

- to determine whether the existing network is meeting the intended monitoring objectives,
- to evaluate the network's adequacy for characterizing current air quality and impacts from future industrial and population growth, and
- to identify/discuss potential areas where new monitors can be sited or removed to support network optimization and/or to meet new monitoring objectives.

To meet these objectives, a series of analyses will be performed to address the following questions on the network:

- How well does the current monitoring network support the current objectives? Which objectives are being met, and which objectives are not being met? Are unmet objective(s) appropriate concerns for the District? If so, what monitoring is necessary to meet those unaddressed objectives? What are potential future objectives for the monitoring network?
- Are the existing sites collectively capable of characterizing all criteria pollutants? Are the existing sites capable of characterizing criteria pollutant trends (spatially and temporally)? If not, which areas lack appropriate monitoring? If needed, where should new monitors be placed? Does the existing network support future emissions assessment, reconciliation, and modeling studies? Are there parameters (at existing sites) or new sites that need to be added to support these objectives?
- Is the current monitoring network sufficient to adequately assess local air quality conditions with respect to all criteria pollutants? If not, where should monitors be relocated or added to improve the overall effectiveness of the monitoring network? How can the effectiveness of the monitoring network be maximized?

This assessment details the current monitoring network in the San Diego Air Basin (SDAB) for the criteria pollutants:

- ozone (O_3),
- nitrogen dioxide (NO_2),
- carbon monoxide (CO),
- sulfur dioxide (SO_2),
- lead (Pb),
- fine particulate matter 2.5 micrometers and less in diameter ($PM_{2.5}$), and
- particulate matter 10 micrometers and less in diameter (PM_{10}).

This assessment also evaluates the non-criteria pollutants/programs in the District air monitoring network (some are federally mandated). These pollutant/programs are:

- Photochemical Assessment Monitoring Stations (PAMS) for Volatile Organic Compounds (VOC) and Carbonyls-This program is mandated.
- National Core (NCore)-This program is mandated.
- Toxics-VOC.

This assessment considers the aforementioned parameters, with particular attention paid to ozone and $PM_{2.5}$ due to concerns with attainment status and health effects, in terms of associated monitoring requirements and a shrinking budget. This report describes the network of ambient air quality monitors operated by the District, analyzes the effectiveness and efficiency of the monitors in regards to the overall network, and makes recommendations for changes to the network.

Rating System Used to Rank the Monitors and Stations

The District used a multilayered approach to rank the air monitors, samplers, and stations. This method included the following:

- trends data,
- monitor designation/purpose of the monitor/purpose of the station,
- quality assurance needs,
- number of monitors and samplers at a site,
- nearby influences,
- community need,
- type of community,
- population shift,
- rate of asthma, chronic obstructive pulmonary disease (COPD), and heart related issues in the community,
- EPA Network Assessment Tools (Correlation, Removal Bias, and Area Served), and
- recent expenditures to the station.

Except for number of monitors, each parameter was rated on a scale of 1-10, with 10 representing the highest score and entered into a master score sheet much like Figure A. For example, if a station is located in an Environmental Justice (EJ) area, the station would receive a “10” for type of community and a“10” for community need. Thus, the overall ranking would be biased high, due to the previously stated parameters, to counter lower rankings from the EPA tools, which do not take into account the needs of the community.

Trends data
The duration of historical data, which is valuable for tracking pollutant trends, is useful for assessing the effectiveness of air pollution reduction programs. Rankings are irrespective of monitor redundancy with another site. If a monitor has an established trend and is needed, it received a high ranking.

Monitor designation/purpose of the monitor/purpose of the station
Some monitors have designations that will require multiple layers of approval to remove or relocate. For example, changes regarding the Photochemical Assessment Monitoring Stations (PAMS) required monitors will need EPA-National approval, which is very lengthy process; such monitors received a high ranking.

Quality assurance needs
Some sites are needed for quality assurance purposes. For example, collocated particulate instrumentation must be located in areas that approach the NAAQS or have a higher probability of approaching the NAAQS. These sites were awarded higher rankings than others.

Number of monitors and samplers at a site
Sites having the most parameters were ranked higher. Each monitoring instrument counts as one parameter. This method takes into account budgetary apportionment, because one site with several instruments has a cost savings in time and travel over another site with fewer instruments.

Nearby influences
Is the station in place to record possible influence(s) from a power plant or a freeway, for example? If the station has such a purpose, it received a higher score than a site that does not. Conversely, if a station was established to record possible influences and those influences have since been removed, it received a lower score than a typical ambient station.

Community need
Did a community action group request monitoring in their area? Has that group come to rely on these monitors? Stations that have such instrumentation received a higher score than stations that were not requested.

Type of community
Is the community a bedroom community, industrial zone, or mixed use? The rating is highest for a mixed use community, because industrial pollutants have a greater impact on the residents of the community. A predominantly bedroom community was rated the lowest, because there is less pollutant impact (unless it is immediately downwind of a pollution source).

Population shift
Is this a community in which the station is located whose population is growing, decreasing, or relatively the same? Is the community in a desirable area, where population will grow? These areas received a higher ranking.

Rate of asthma, COPD, and heart related issues in the community
Data were culled from local, State, and Federal resources to ascertain if a community in which a station is located has a higher rate of the titled health issues. If so, these stations received a higher ranking than ones with a lower percentage of the population with these aliments.

EPA Network Assessment Tools (Correlation, Removal Bias, and Area Served)
The report generated using the Network Assessment Tools was rated according to the results without consideration of other parameters. If the tool showed that a monitor is redundant, the monitor received a low rating (advocating removal), without regard to the area served or type of community. This method ensures an unbiased ranking.

Recent expenditures to the station
If significant capital has been spent upgrading a station for safety or other reasons, then the station received a higher rating due to the recent (within the last five years) expenditure. For example, a new wooden sampling deck costs $35,000 (about 1/3 the cost of an entire station start-up); therefore, if a station recently upgraded to a new deck, then it received a higher number than one that was not.

Figure A Station Score Sheet

	Trends	Purpose	QA	No. of Monitors	Nearby Influences	Community Need	Type of Community	Population Shift	Health	Correlation	Removal	Area Served	Recent Expenditures	**TOTAL**
Alpine (ALP)														
Camp Pendleton (CMP)														
Chula Vista (CVA)														
Del Mar (DMR)														
Otay Mesa-Donovan (DVN)														
El Cajon. (FSD)														
Escondido (ESC)														
McClellan-Palomar Airport (CRQ)														
San Diego-Beardsley (DTN)														
San Diego-Kearny Villa Rd. (KVR)														
San Diego-Rancho Carmel Dr. (RCD)														
San Ysidro (SAY)														

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Executive Summary

The San Diego County Air Pollution Control District (District) is required by the U.S. Environmental Protection Agency (EPA) to complete a Network Assessment of its air monitoring network every five years. This latest assessment (2015) fulfills this requirement, and the Network Assessment is being made to the public.

The Network Assessment documents the current status of the District's air monitoring network, and whether or not the network is properly designed to adequately measure the air pollution that the residents of San Diego County are exposed to on a daily basis. This Executive Summary is provided to give the reader an introduction to the document and its findings. For more detailed information the reader is encouraged to explore the entire document.

Section I Results of the Scoring of the San Diego County Air Monitoring Network Assessment

The District recently relocated several stations and started-up other stations (and will be relocating and starting up additional stations in Fiscal Year 2015/2016). These recent and projected activities were facilitated by a thorough evaluation of our air quality monitoring network. This entailed a full network review that answered the same questions required in the 5-year Network Assessment report, including:

- Do we have unnecessarily redundant stations and/or monitors?
  - -If so, can we close the station and not create an air quality monitoring gap?
  - -If not, can we decommission monitors within the station without creating a gap?
- Do we have an existing air quality monitoring gap(s)?
  - -Are there gaps in our network that can only be filled by adding a new station?
  - -Are there gaps in our network that can be filled by adding monitors to a station(s)?
  - -Can the gaps be covered by modeling or the extrapolation of data from existing stations?
- Are our stations and monitors/samplers still valid for the air quality purpose they were designed?
  - -If not, why?
  - -Is it outmoded technology, obstructions to the airflow, the growth of trees around the station, and other such reasons.

Consequently, the results from the using the EPA Network Assessment tools were not unexpected.

Our internal network review and the review using the EPA Network Assessment tools revealed that there is:

- No need for any major changes (adding/relocating/closing stations) beyond those already planned or anticipated;
- However, we do recommend some minor changes to remove borderline redundancy and/or costly monitors and adding certain non-criteria pollutant monitors to sites, if funding allows.

The Executive Summary encapsulates all the network assessment summaries and recommendations for the individual pollutants as determined in each chapter of this assessment, including monitor decommissioning, station expansions, station closures, or relocations. Table 1 provides a summary of the 2015 Network Assessment scores.

Table I Summary of the San Diego County Air Monitoring Network Assessment Scoring

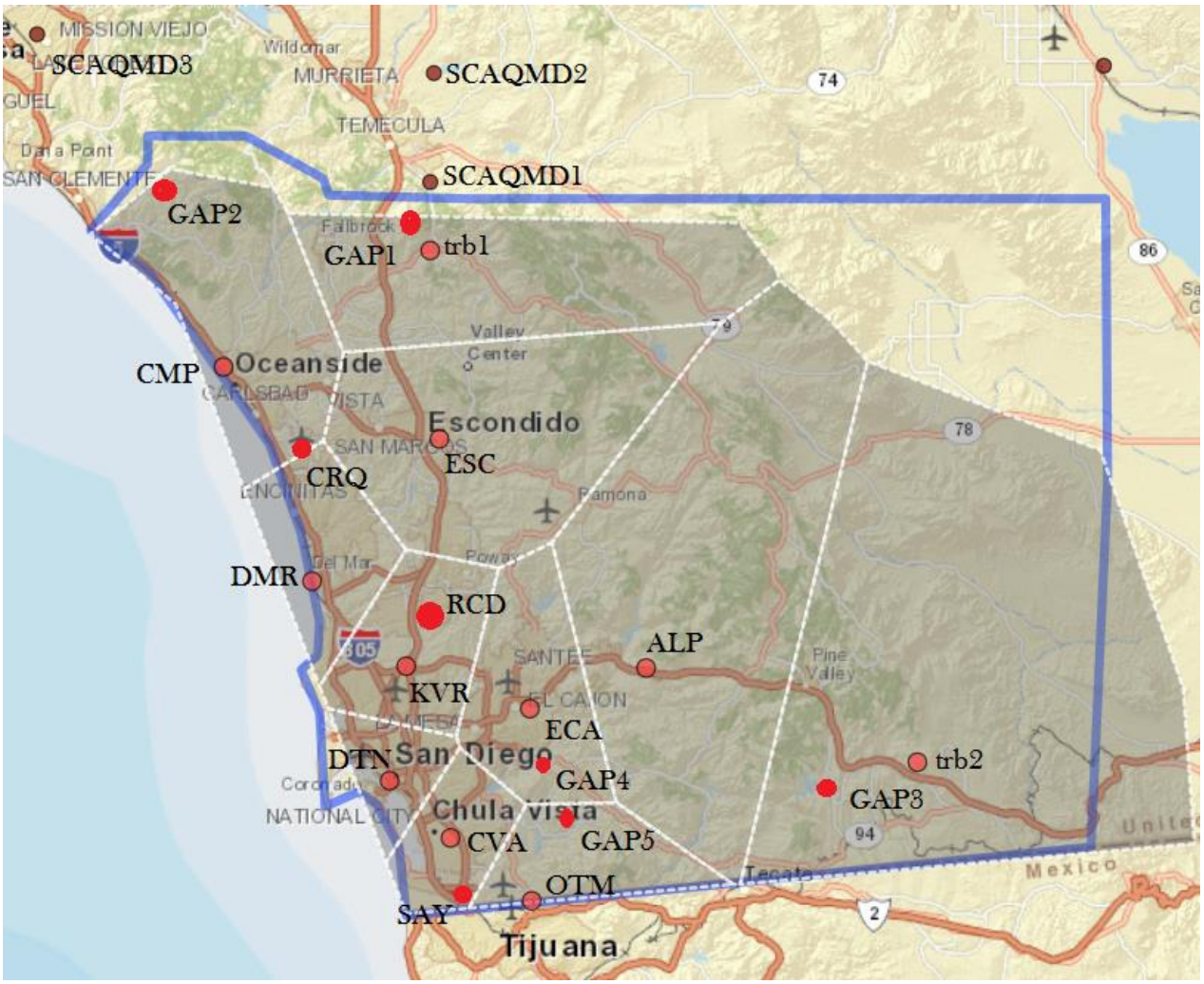
	TOTAL SCORE	O_3 Scoring	NOx Scoring	CO Scoring	SO_2 Scoring	Pb Scoring	$PM_{2.5}$ Scoring	PM_{10} Scoring	PAMS-Carbonyls Scoring	PAMS- VOC Scoring	Toxics-Metals Scoring	Toxics- VOC Scoring	$PM_{2.5}$ Speciation Scoring	Population Scoring	Health Risk Scoring
San Diego-Beardsley (DTN)	**410**	72	38	34	n/a	n/a	86	26	24	n/a	40	40	30	10	10
El Cajon (ECA)	**391**	87	43	34	**A**	**A**	86	44	30	30	n/a	n/a	66	7	8
Escondido (ESC)	**383**	68	36	34	n/a	n/a	73	32	**B**	n/a	33	33	60	8	6
Otay Mesa-Donovan (DVN)	**253**	58	29	n/a	n/a	n/a	28	33	28	n/a	32	32	**E**	7	6
Chula Vista (CVA)	**227**	71	30	n/a	n/a	n/a	75	34	n/a	n/a	n/a	n/a	n/a	8	9
San Diego-Kearny Villa Rd. (KVR)	**209**	64	27	n/a	n/a	n/a	49	24	31	n/a	n/a	n/a	n/a	10	4
Camp Pendleton (CMP)	**206**	72	27	n/a	n/a	n/a	61	n/a	n/a	33	n/a	n/a	n/a	10	3
Alpine (ALP)	**180**	63	28	n/a	n/a	n/a	49	n/a	n/a	32	n/a	n/a	n/a	2	6
2nd Near-road Site (to be determined)	**109**	n/a	29	24	n/a	n/a	37	n/a	**B**	n/a	**C**	**D**	n/a	9	10
Rancho Carmel Dr. (RCD)	**104**	n/a	27	27	n/a	n/a	34	n/a	**B**	n/a	**C**	**D**	n/a	10	6
San Ysidro (SAY)	**44**	n/a	n/a	n/a	n/a	n/a	31	n/a	n/a	n/a	**C**	**D**	**E**	7	6
Del Mar (DMR)	**22**	21	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	1
Palomar Airport (CRQ)	**5**	n/a	n/a	n/a	n/a	**A**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5

A. This federally required monitor has no pollutant scoring.
B. Because the surrounding areas are highly impacted by formaldehyde (which is the top cancer driver), carbonyls analyses should be expanded to include this site, if funding and staffing become available.
C. Toxics-Metals analyses should be expanded to include this site representing highly impacted areas, if funding and staffing becomes available.
D. Toxics-Volatile Organic Compounds (VOC) analyses should be expanded to include this site representing highly impacted areas, if funding and staffing becomes available.
E. $PM_{2.5}$-speciation analyses should be expanded to include this site representing highly impacted areas, if funding and staffing becomes available.

<u>Scoring</u>

1. For all columns, the higher the score, the better. It means the District is justified in keeping that parameter/program/station.
2. A high score for any parameter means that that air pollution monitor/sampler/program is needed at that location.
3. The higher the score is for the Population or Health Risk metric, the more that station is needed in that locale.

Figure I Map of the San Diego County Air Quality Monitoring Network



Legend:

ECA= El Cajon
DMR= Del Mar
ESC= Escondido
ALP= Alpine
CMP= Camp Pendleton
DTN San Diego-Beardsley St./Downtown San Diego
KVR= Kearny Villa Rd.
OTM= Otay Mesa now Otay Mesa-Donovan (DVN*)
CVA= Chula Vista
RCD= Rancho Carmel Dr.
SAY= San Ysidro
CRQ= McClellan-Palomar Airport
trb1= Pala (not a San Diego APCD air monitoring site)
trb2= Blvd (not a San Diego APCD air monitoring site)

GAP1= Inland North County
GAP2= Coastal North County
GAP3= East County
GAP4= Mid-County
GAP5= Southeast County
SCAQMD1= Temecula
SCAQMD2= Elsinore
SCAQMD3= Mission Viejo

*The new DVN station is 2.2 miles northeast of the old OTM station, but is too close to graph on the map.

Section II Station/Sampler/Monitor Changes to the San Diego County Air Monitoring Network

No matter how in-depth a numerical analysis, scoring, or ranking system is, it will not consider all the factors. For example, the Rancho Carmel Drive station has a total score of 104, which is very low compared to the El Cajon station (391), and yet both sites and most of the samplers and monitors housed by these stations are federally mandated. This section explains the purpose of each station, starting with the highest score (therefore the highest rated) and ending with the lowest scored station.

Except for the Del Mar site, all ambient/neighborhood scale air monitoring stations that have an O_3 monitor also have a collocated NOx monitor. The two pollutants have an inverse relationship. Therefore, they serve as an automated data validation tool for each other. For example, if the NOx monitor at ECA has seemingly anomalous high values, but the O_3 monitor has corresponding dips in concentrations, the O_3 and NOx data is real and the data is kept.

The NOx analyzers also serve a vital role by documenting the effectiveness of the cumulative effects of air pollution control programs and technologies. Therefore, all NOx monitors are considered essential and will not be discussed further in this summary in regards to decommissioning.

1. San Diego-Beardsley St. (DTN)
   This station is located in an Environmental Justice (EJ) area. Most of its instruments are federally mandated. The NOx and $PM_{2.5}$ concentrations are relatively high for the air basin. Due to community concerns regarding the heavy industry surrounding the neighborhood, the District expanded monitoring at the site by adding the following non-mandated monitors or samplers:
   - PAMS-Carbonyls
   - Toxics-Metals
   - Toxics-VOC
   - $PM_{2.5}$ speciated
   - PM_{10}

   RECOMMENDATIONS
   - ✓ The station will neither be closed nor relocated.
   - ✓ All Historical PM_{10} data should be reviewed for possible decommissioning of the sampler.

2. El Cajon (ECA)
   This station is federally mandated for PAMS and NCore. The non-mandated equipment includes the following:
   - NOx
   - $PM_{2.5}$ speciated (for Carbon) sampler (channel 3) for the District's internal CSN program

   The NCore program requires total reactive nitrogen (NOy) sampling, which is very costly. The values measured with the collocated NOx monitor show similar values as the measured NOy concentrations (see the Annual Network Plan for more detail). The District will use this redundancy to decommission the NOy monitor when the EPA permits such action. The District uses the black carbon analysis at ECA as a baseline for the ESC and DTN locations. The SO_2 concentrations are so low that they are insignificant (cannot be plotted with the same scale as the NAAQS standard). The Lead concentrations register ambient levels.

RECOMMENDATIONS

- ✓ The station will neither be closed nor relocated.
- ✓ The District recommends that the EPA consider decommissioning the Pb-TSP sampler, the NOy monitor and the SO_2 monitor.

3. Escondido (ESC)

Located east of the most trafficked Interstate highway and State Route in the air basin, this station is situated in a borderline EJ location. Its NOx and $PM_{2.5}$ concentrations are relatively high for the air basin. The non-mandated equipment includes the following:

- CO
- Toxics-VOC
- $PM_{2.5}$ speciated (for Carbon) sampler (channel 3) for the District's internal CSN program

This CO monitor typically registers the highest concentrations for the San Diego air basin. The Toxics-VOC and $PM_{2.5}$ speciated samplers are the northernmost and easternmost samplers in the District's Toxics and Carbon networks, respectively.

RECOMMENDATIONS

- ✓ The station will neither be closed nor relocated.
- ✓ All samplers and monitors will be retained.
- ✓ If funding and staffing become available, PAMS-Carbonyls should be added.

4. Otay Mesa-Donovan (DVN)

This station is the District's southeastern most site and is approximately 2.2 miles from the Otay Mesa border crossing. Otay Mesa is the busiest Heavy-Duty truck crossing in California and one of the busiest in the nation. Upwind and north of this station are the second fastest growing areas in the County. The NOx monitor is used to measure the cross-border influence of the heavy-truck traffic. This station was relocated to the R.J. Donovan State Prison area from the U.S. Customs parking lot at the Otay Mesa border crossing. Not all equipment housed here is mandated by the EPA, but some are requested by the EPA. The non-mandated and requested equipment includes the following:

- Toxics-Metals
- Non-FEM $PM_{2.5}$ sampler (EPA requested)
- Toxics-VOC

RECOMMENDATIONS

- ✓ The station will neither be closed nor relocated.
- ✓ All samplers and monitors will be retained.
- ✓ If funding and staffing becomes available, PAMS-Carbonyls should be added.

5. Chula Vista (CVA)

This station is located midway between the Downtown station and the San Ysidro border crossing. The city of Chula Vista has one of the highest rates of respiratory ailments in the County. Because the station is located inland, the measured concentrations can be used to interpolate the concentrations for surrounding cities and communities. This station will have its deck for PM samplers completely remodeled. The non-mandated equipment includes the following:

- O_3
- PM_{10}

RECOMMENDATIONS

- ✓ The station will neither be closed nor relocated.
- ✓ Historical PM_{10} data should be reviewed for possible decommissioning.
- ✓ A $PM_{2.5}$ FRM sampler should be added for quality assurance/collocation purposes (relocated from KVR station).

6. San Diego-Kearny Villa Road (KVR)

This station is located in the secondary business district of San Diego. As it is inland, the data from this station are used for many surrounding communities. All equipment is mandatory. This station was recently relocated. The non-mandated equipment includes the following:

- PM_{10}

RECOMMENDATIONS

- ✓ The station will neither be closed nor relocated.
- ✓ The $PM_{2.5}$ FRM sampler used for quality assurance/collocation purposes should be relocated to CVA.
- ✓ Historical PM_{10} data should be reviewed for possible decommissioning.

7. Camp Pendleton (CMP)

This location is the District's northernmost station, and it records transport from the South Coast Air Basin. Furthermore, the data from this area are used to interpolate the concentrations for the communities (north and south) along State Route 76 & 78. These areas are the fastest growing in the County. The non-mandated equipment includes the following:

- $PM_{2.5}$ non-FEM continuous

RECOMMENDATION

- ✓ The station will neither be closed nor relocated.
- ✓ All samplers and monitors will be retained.

8. Alpine (ALP)

This location is the easternmost station of the District's air monitoring network. It monitors the air downwind of the County's major metropolitan areas. It is the ozone Design Value site, and it recently was relocated back to its original location (move was across the street due to construction activities). The non-mandated equipment includes the following:

- $PM_{2.5}$ non-FEM continuous

RECOMMENDATIONS

- ✓ The station will neither be closed nor relocated.
- ✓ All samplers and monitors will be retained.

9. 2nd Near-Road Site

The District is in negotiations with local authorities to locate the 2nd Near-road station in Logan Heights (across Interstate 5, about 0.8 miles, from our ambient air monitoring station in Barrio Logan). Logan Heights is an EJ area, giving this station a higher ranking than the 1st Near-road site.

RECOMMENDATIONS

- ✓ If funding and staffing becomes available, PAMS-Carbonyls, Toxics-VOC, and Toxics-Metals should be added.
- ✓ Add a CO monitor, if funding becomes available.

10. Rancho Carmel Drive (RCD)
This area is one of the most heavily trafficked areas in the County. There is no non-mandated equipment at this site.

RECOMMENDATIONS

- ✓ If funding and staffing becomes available, PAMS-Carbonyls, Toxics-VOC, and Toxics-Metals should be added.
- ✓ A $PM_{2.5}$ sampler could possibly be added for comparison data from ESC.

11. San Ysidro (SAY)
This temporary $PM_{2.5}$ sampling site was requested by the EPA and the community. Measurements will continue through early 2017 (or until the current location is demolished).

RECOMMENDATIONS

- ✓ None

12. Del Mar (DMR)
This station monitors ozone and wind. The station's primary purpose is to measure offshore transport of ozone impacting the coastal areas of San Diego county.

RECOMMENDATIONS

- ✓ If the station is ever relocated, instrumentation should be expanded to include NOx and possibly $PM_{2.5}$ instrumentation.

13. Palomar Airport (CRQ)
This station is federally mandated, due to measured concentrations for airborne lead particulate matter triggered a requirement for permanent sampling. If the measured concentrations are less than 80% of the NAAQS for three consecutive years, the District will petition the EPA to close this site. Furthermore, according to EPA sources, by the end of 2018, aviation fuel will be unleaded.

RECOMMENDATIONS

- ✓ This site should be closed when the above conditions are met.

Section III Gaps in the San Diego County Air Monitoring Network

A. Inland North County

The 2010 Network Assessment revealed a possible gap in the air pollution monitoring network in the areas north, northwest, and northeast of the Escondido monitoring station. This region includes the Hidden Valley/Rainbow/Pala, Fallbrook/Bonsall, and Pauma Valley/Valley Center areas (GAP1 in Figure 1). The current Network Assessment found similar results

RECOMMENDATIONS

- ✓ No new/additional stations are suggested for the north and northwest areas. The South Coast Air Quality Management District (SCAQMD) has monitors for ozone, nitrogen dioxide, PM_{10}, and $PM_{2.5}$ in the area north of Escondido, Temecula (SCAQMD1 in Figure 1) and Elsinore (SCAQMD2 in Figure 1). The ozone, nitrogen dioxide, PM_{10}, and $PM_{2.5}$ concentrations for the general areas of Bonsall and Fallbrook can be derived from the Escondido and Temecula data.
- ✓ No new/additional stations are suggested for the northern areas of San Diego County. Studies have shown that the measured concentrations are equivalent to those observed at the Escondido station and that no new information will be gained.

B. Coastal North County

The 2010 Network Assessment revealed a possible gap in the air pollution monitoring network in the area north of the Camp Pendleton monitoring station (GAP2 in Figure 1). The current Network Assessment found similar results.

RECOMMENDATIONS

- ✓ No new/additional stations are suggested, since this area is very sparsely populated due to the Camp Pendleton military base. Furthermore, any new location would just measure transport from the Los Angeles air basin, and this phenomena is already measured at the Camp Pendleton station. The SCAQMD has monitors north of the Camp Pendleton border (SCAQMD3 in Figure 1) in the Mission Viejo area, so the District can track air quality concentrations using their data.

C. East County

The 2010 Network Assessment revealed a possible gap in the areas east of the Alpine station (GAP3 in Figure 1). The current Network Assessment found similar results.

RECOMMENDATIONS

- ✓ No new/additional stations are suggested, since the areas east of the Alpine station have low population centers, low traffic counts, and similar topography. An additional ozone monitor in this area would add little value. Additionally, District studies in these areas have shown the measured concentrations to be the same (just time delayed) as Alpine.

D. Mid-County

The 2010 Network Assessment revealed a possible gap in coverage northeast and southwest of the Chula Vista and El Cajon monitoring stations, respectively (GAP4 in Figure 1). The current Network Assessment found similar results.

RECOMMENDATIONS

- ✓ When resources become available, temporary sampling may be conducted to ascertain if air monitoring coverage needs to be expanded to include this area. Although previous studies have shown that the measured concentrations are equivalent to the average concentration between the Downtown and El Cajon stations, the EPA's NATA and EJView database do indicate a difference in VOC values.

E. Southeast County

The Network Assessment showed the Otay Mesa-Donovan station has a wide coverage area (GAP5 in Figure 1). The Eastlake area is the second fastest growing area in the County.

RECOMMENDATIONS

- ✓ When resources become available, temporary sampling may be conducted to ascertain if air monitoring coverage needs to be expanded to include this area. Although previous studies have shown that the measured concentrations are equivalent to those observed at Otay Mesa, the population has grown and further testing in the Proctor Valley may now be necessary.

Chapter 1 Overview of the Network

Section 1.0.0 San Diego Air Basin General Information

The first step in performing a network assessment is gaining an understanding of the current and historical network, characteristics of the air basin, and objectives for each monitoring site, as well as population shifts and pollutants trends.

The topography of San Diego County is highly varied, being comprised of coastal plains and lagoons, flatlands and mesas, broad valleys, canyons, foothills, mountains, and deserts. Generally, building structures are on the flatlands, mesas, and valleys, while the canyons and foothills tend to be sparsely developed. This segmentation is what has carved the region into a conglomeration of separate cities that led to low density housing and an automobile-centric environment.

The topography also drives the pollutant levels. The San Diego Air Basin (SDAB) is not classified as a contributor; instead, it is classified as a transport recipient. The transport pollutants are O_3, NOx, and volatile organic compounds (VOCs), which are transported from the South Coast Air Basin to the north and, when the wind shifts direction, Tijuana, Mexico, to the south.

The climate also drives the pollutant levels. The climate of San Diego is classified as Mediterranean, but it is incredibly diverse due to the topography. The climate is dominated by the Pacific High pressure system that results in mild, dry summers and mild, wet winters. The Pacific High drives the prevailing winds in the SDAB. The winds tend to blow onshore during the daytime and offshore at night. In the summer, an inversion layer develops over the coastal areas, which increases the O_3 levels. In the winter, San Diego often experiences a shallow inversion layer that tends to raise carbon monoxide and $PM_{2.5}$ concentration levels due to the increased use of residential wood burning.

In the fall months, the SDAB is often impacted by Santa Ana winds. These winds are the result of a high pressure system over the Nevada-Utah region that overcomes the westerly wind pattern and forces hot, dry winds from the east to the Pacific Ocean. These winds are powerful and incessant. They blow the air basin's pollutants out to sea. However, a weak Santa Ana can transport air pollution from the South Coast Air Basin and greatly increase the San Diego O_3 concentrations. A strong Santa Ana also primes the vegetation for firestorm conditions.

Section 1.1.0 Network Design Requirements

The EPA regulations specify the minimum number of sites at which State and local air agencies must deploy monitors. The State and local agencies generally find they need to deploy more monitors than are minimally required to fulfill State and local purposes for monitoring. For example, the California air quality standards are often more stringent than the National standards; thereby, many areas need more monitors than required to show compliance with State and National standards.

For pollutant monitoring, the minimum requirements for the number of monitors are provided in the 40 CFR 58, Appendix D "Network Design Criteria for Ambient Air Quality Monitoring". Each pollutant has different requirements for determining the minimum number of monitors needed for a Metropolitan Statistical Area (MSA), and the requirements can change yearly. The MSA is based upon the total population within the district. Some districts are comprised of multiple air basins. The County of San Diego encompasses San Diego County and part of the Salton Sea air basins, as outlined by the California Air Resources Board. Also, some pollutants have additional monitoring requirements associated with them, e.g., $PM_{2.5}$ monitoring has requirements for continuous and sequential monitors.

Each section in this report that discusses the criteria pollutants lists the current Network Design Criteria for Ambient Air Quality Monitoring. For all pollutants, the District is required to ensure that sufficient monitoring exists in the County, according to 40 CFR 58, Appendix D "Network Design Criteria for Ambient Air Quality Monitoring". This section summarizes the minimum monitoring requirements from the criteria pollutant chapters in this report. For greater detail, refer to the specific pollutant's chapter.

The District develops changes to its monitoring network in several ways. New monitoring locations and/or additional monitors have been added as a result of community concerns about air quality, e.g., the Downtown $PM_{2.5}$ monitor that was established in the Barrio Logan area and as part of the District's internal $PM_{2.5}$ speciation network. Other monitors have been established as a result of special studies, e.g., the TSP-Pb monitor that was established at the McClellan-Palomar Airport.

The most common reasons for monitors being removed from the network are that the land/building is modified, such that the site no longer meets current EPA siting criteria, the area surrounding the monitor is being modified in a way that necessitates a change in the monitoring location, or the landowner wants the land for other purposes. The most current example of this case is the El Cajon/NCore site. This site was moved in 2014 due to the construction of a new building on the lot where the station was located. Monitors are also removed from the network after a review of the data showed that the levels have dropped to the point where it is no longer necessary to continue monitoring at that location. An example of this situation is the elimination of ambient level SO_2 monitors from the network.

Section 1.2.0 San Diego Air Pollution Control District Network Design

The topography, climate, and population distribution are the main contributing factors into the design of the ambient air quality network for the SDAB. The District has conducted occasional air monitoring in remote portions of the County, including the mountain and desert areas. Historical measurements have shown relatively low levels of air pollution in these areas. The population and growth in these areas have remained low enough that routine air sampling has not become necessary. Measurements of harmful air contaminants are found in those areas where the population is dense, traffic patterns are heavy, and industrial sources are concentrated.

As pollutants are carried inland by prevailing winds, they are frequently trapped against the mountain slopes by a temperature inversion layer, generally occurring between 1500 and 2500 feet above sea level. Therefore, our air monitoring stations are found between the coast and the mountain foothills up to approximately 2000 feet. The monitoring network needs to be large enough to cover the diverse range of topography, meteorology, emissions, and air quality in San Diego, while adequately representing the large population centers. This monitoring network plays a critical role in assessing San Diego County's clean air progress and in determining pollutant exposures throughout the County.

The ambient air quality is routinely measured for air pollutants at several locations. All these sites are operated by the District. The measured data provide the public with information on the status of the air quality and the progress underway to improve air quality. The data can be used by other interested parties, such as health researchers and environmental groups or organizations with business interests.

Ambient concentration data are collected for a wide variety of pollutants. In the SDAB, the most important of these pollutants are ozone, $PM_{2.5}$, PM_{10}, and a number of toxic compounds. Other measured pollutants include oxides of nitrogen, carbon monoxide, sulfur dioxide, and lead. Monitoring for meteorological parameters is also conducted at most monitoring locations. Data for all of the pollutants are needed to better understand the nature of the ambient air quality in San Diego County, as well as to inform the public

regarding the quality of the air they breathe. Not all pollutants are monitored at all sites, but most sites monitor for multiple pollutants. A particular site's location and monitoring purpose determine the actual pollutants measured at that site.

A fundamental purpose of air monitoring is to distinguish between areas where pollutant levels exceed the ambient air quality standards and areas where those standards are not exceeded. Health-based ambient air quality standards are set at levels that preclude adverse impacts to human health (allowing for a margin of safety). The District develops strategies and regulations to achieve the emission reductions necessary to meet all health-based standards. Data from the ambient monitoring network are then used to indicate the success of the regulations and control strategies in terms of the rate of progress toward attaining the standards or to demonstrate that standards have been attained and maintained. Thus, there is an established feedback loop between the emission reduction programs and the ambient monitoring programs. Over the years, Federal, State, and District regulatory/strategic measures have proven to be extremely successful at reducing levels of harmful air contaminants. Monitors once placed throughout the County to document the frequent and regular exceedance of ozone, nitrogen dioxide, carbon monoxide, and particulate matter standards now record the continued downward concentration trends of these pollutants.

Section 1.3.0 Current San Diego Air Pollution Control District Air Quality Monitoring Network

All monitors are reviewed on a regular basis to determine if they are continuing to meet their monitoring objectives. To complete this step, a thorough review of each site in the network was performed. District staff travelled to each site and performed a site evaluation. Monitor coordinates were verified, as were distances to roadways and obstacles. Has the population, land use or vegetation around the monitor changed significantly since the monitor was established? If it has, is there a better location for the monitor? All files were updated, and the process of verifying the monitoring sites' objectives began. Table 1.1a lists the locations and monitoring parameters of each site currently in operation in the SDAB. Table 1.1b lists the pertinent EPA Air Quality System (AQS) database information for each site.

The District does not own the property on which any air monitoring stations are located; consequently, the District cannot alter or destroy vegetation without landlord consent, influence new structure encroachment, and must relocate when notified by the landlord, as well as other reasons. Over the last few years, the District has had to relocate or start-up 1-2 stations per year for any combination of the aforementioned reasons. The average cost of an air monitoring station start-up is $100,000, not including monitoring equipment; meanwhile, the dismantling and destruction of an old air monitoring station costs approximately half the start-up costs, depending on a myriad of County requirements. These station relocations (temporary and permanent) and destructions, as well as new EPA program start-up programs, place a severe additional strain on the constantly shrinking air monitoring budget.

Due to these recent ambient air monitoring station relocations, the District already has undertaken a scaled-down version of a Network Assessment. Consequently, no recent station start-up/relocation will be closed; furthermore, no air monitoring equipment in those stations will be decommissioned immediately, because the instrumentation, as well as the station itself, was fully vetted for decommissioning or full station closure. No relocated station triggered any internal District threshold for closure. Additionally, most air monitoring equipment did not trigger any internal District threshold for decommissioning. The District has relocated or started-up the following stations within the last five years (the period of the last Network Assessment):

- San Diego-Overland to Kearny Mesa Road
- Otay Mesa-Border Crossing to Otay Mesa-Donovan,
- El Cajon-Redwood Ave. to El Cajon-Floyd Smith Drive,
- Alpine (across the street),

- Palomar (start-up),
- Rancho Carmel Drive (start-up), and
- San Ysidro (start-up).

The District anticipates the following large one-time expenditures to handle over the next 18-24 months:

- two station destructions (the temporary Alpine location and the old Otay Mesa location),
- one new station start-up (2nd Near-road),
- the complete remodeling of the Chula Vista wood deck/sampling platform,
- one station relocation (the temporary El Cajon station back to its original location),
- two possible station relocations, due to landlord tenancy issues (Del Mar and Escondido), and
- one possible station relocation/startup for San Ysidro (certainly the destruction, once the project is competed).

If all the aforementioned tasks actually come to fruition, the only sites in the air monitoring network that will not have had significant capital recently invested in their upkeep will be the Camp Pendleton and Downtown stations. The Downtown station is in an Environmental Justice (EJ) area, and all its monitors are required by the EPA, requested by local concerned citizens, or added by the District for internal reasons. The Camp Pendleton station is the northernmost air monitoring location in the network, and it records pollution transport from the South Coast Air Basin. Both stations and the instrumentation therein are required, and neither will be decommissioned. As stated earlier, due to the recent flurry of station relocations and start-ups and new EPA monitoring programs (which require additional instrumentation), all stations have already been fully vetted by District staff for station closure or instrumentation decommissioning. All the stations were considered necessary for coverage, and any equipment deemed redundant or unnecessary was already decommissioned before relocation or start-up.

Table 1.1a Air Monitoring Sites with All Samplers

		ALP	CMP	CVA	DMR	DVN	ECA[1]	ESC	KVR	CRQ	DTN	RCD	SAY
		Alpine	Camp Pendleton	Chula Vista	Del Mar	Donovan	El Cajon	Escondido	Kearny Villa Rd.	Palomar Airport	Beardsley St.	Rancho Carmel Dr.	San Ysidro
AMBIENT	O_3	✓	✓	✓	✓	✓	✓	✓	✓		✓		
	NO_2	✓	✓	✓		✓	✓	✓	✓		✓	✓	
	CO							✓			✓	✓	
NCORE	NOy-TLE						[2]						
	CO-TLE						✓						
	SO_2-TLE						✓						
LEAD	(NCore) (Hi-Vol)						✓						
	(Airports) (Hi-Vol)									✓			
PM_{10}	(NCore) (Lo-Vol)						✓						
	(Ambient) (Hi-Vol)			✓		✓		✓	✓		✓		
$PM_{2.5}$	(non-FEM) (Continuous)	✓	✓			✓	✓				✓		✓
	(FRM) (Sequential)			✓			✓	✓	✓		✓		
STN	Channel 1 (Metals)						✓	✓					
	Channel 2 (Inorganic Ions)						✓	✓					
	Channel 3 (Wood Smoke)							✓					
CSN SU	(Carbon)						✓	✓					
	Channel 4 (Carbon)						✓	✓			✓		
PAMS	(VOC)	✓	✓				✓						
	(Carbonyls)						✓						
UN	Channels 2 & 3 (Carbonyls)										✓		
TOXICS CA-TAC (CARB)	(VOC)			✓			✓						
	(Total Metals)			✓			✓						
	(Cr^{+6})			✓			✓						
	(Aldehydes)			✓			✓[3]						
SU (APCD)	(VOC)					✓		✓			✓		
	Channel 1 (Total Metals)					✓					✓		
METEROLOGICAL PARAMETERS + Others	Wind Speed/ Wind Direction	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
	External Temperature	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓
	% Relative Humidity	✓					✓		✓			✓	
	Internal Temperature	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
	Barometric Pressure								✓				
	Solar Radiation								✓				
	Radar Wind Profiler/ Radio Acoustic Sounding								✓				

Areas in yellow indicate a collocation of samplers to satisfy Federal Quality Assurance (QA) requirements. Collocated $PM_{2.5}$ Federal Reference Method (FRM) monitors and PM_{10} monitors have a sampling frequency of 1:12 and 1:6, respectively. All other collocated monitors have the same sampling frequency as their respective main monitors. Areas in blue indicate duplicate channels and have the same sampling frequency as the main channel.
[1] The El Cajon (ECA) station was relocated to the Gillespie Field (FSD) area, and sampling began in July.
[2] The District has a waiver to temporarily suspend NOy sampling until the relocation of the station back to the original NCore location on Redwood Ave.
[3] The EPA designated the Chemical Speciation Network (CSN) sampling at FSD as Supplemental Speciation. It will revert back to CSN upon the return to the original sampling location on Redwood Ave.

Table 1.1b lists the District's stations and the pertinent information regarding location.

Table 1.1b Network Sites

Station Name	Station Abbreviation	Address	Latitude/ Longitude	AQS ID
Alpine	ALP	2495A W. Victoria Dr.	32.842324° -116.767885°	06 073 1006
Camp Pendleton	CMP	21441 W. B St.	33.217063° -117.396169°	06 073 1008
Chula Vista	CVA	80 E. J St.	32.631175° -117.059115°	06 073 0001
Del Mar	DMR	225 9th St.	32.952106° -117.264086°	06 073 1001
Donovan	DVN	480 Alta Rd.	32.578267° -116.921359°	06 073 1014
[1]El Cajon	ECA	1155 Redwood Ave.	32.791210° -116.942104°	06 073 0003
Escondido	ESC	600 E. Valley Pkwy.	33.127730° -117.075379°	06 073 1002
Otay Mesa-Donovan	DVN	480 Alta Rd.	32.578267° -116.921359°	06 073 1014
San Diego-Beardsley St.	DTN	1110A Beardsley St.	32.701492° -117.149663°	06 073 1010
Kearny Villa Rd.	KVR	Kearny Villa Rd.	32.845722° -117.123983°	06 073 1016
McClellan-Palomar Airport	CRQ	2192 Palomar Airport Rd.	33.130846° -117.272668°	06 073 1020
Rancho Carmel Dr.	RCD	11403 Rancho Carmel Dr.	32.985442° -117.082180°	06 073 1017
San Ysidro	SAY	795 East San Ysidro Blvd.	32.543475° -117.029028°	06 073 1019

[1]This station is temporarily located at 10537 Floyd Smith Dr.; the District will move the station back to its original location, once the remodeling of the school grounds of the original site has been completed.

For a summary of the site description see Tables 1.2a-1.2c, and 1.3; for greater detail on the Air Quality System (AQS) designations for the monitor type, site type, method, network affiliation, monitor designation, objective, spatial scale, sampling frequency, and equipment used, see each pollutants' chapter.

Table 1.2a Probe Inlet Summary (continued)

(Measurements are in meters)		Spacing from minor sources	Source	Spacing from obstructions	Obstruction	Spacing from trees		Probe inlet distance from traffic lane	AADT	Data compared to NAAQS
						Actual	Required			
ALP	O_3	n/a	none	n/a	none	12.3	>10	16.6	500 est	Yes
	NO_2									
	*$PM_{2.5}$	n/a		n/a		15.9		15.5		No
CMP	O_3	121.4	Military transport vehicles motor pool, repair, and fuel facility	n/a	none	33.3	>10	47.7	500 est	Yes
	NO_2									
	*$PM_{2.5}$	124.8		n/a		34.0		47.0		No
CVA	O_3	n/a	none	n/a	none	35.9	>10	54.3	9,100	Yes
	NO_2									
	CO									
	PM_{10}	n/a	none	n/a	none	34.0		57.8		Yes
	$PM_{2.5}$	n/a	none	n/a	none	34.3		58.0		Yes
DMR	O_3	n/a	none	n/a	none	19.7	>10		3,100 est	Yes
DVN	O_3	800	Peaker power plant	n/a	none	n/a	>10	12	300 est	Yes
	NO_2					n/a				
	PM_{10}	800		n/a	none	n/a		18		Yes
	*$PM_{2.5}$	800		n/a	none	n/a		19		No
RCD	NO_2	32	Interstate 15 (major source)	n	none	32	>10	24.4	11,800	Yes
	CO									Yes
	*$PM_{2.5}$	Not in place yet								

* non-FEM BAM n/a= not applicable est= estimate

Table 1.2b Probe Inlet Summary (continued)

(Measurements are in meters)		Spacing from minor sources	Source	Spacing from obstructions	Obstruction	Spacing from trees		Probe inlet distance from traffic lane	AADT	Data compared to NAAQS
						Actual	Required			
DTN	O_3	n/a	none	n/a	none	11.5	>10	11.6	3,000	Yes
	NO_2									Yes
	CO									Yes
	PM_{10}	n/a		n/a		13.3		10.0		Yes
	$PM_{2.5}$	n/a		n/a		12.7		10.7		Yes
	*$PM_{2.5}$	n/a		n/a		15.3		10.0		No
ECA	O_3	113.4	Metals shop	n/a	none	35.7	>10	14.4	5,300	Yes
	NO_2									Yes
	CO									Yes
	SO_2									Yes
	PM_{10}	117		n/a	none	40.6		11.2		Yes
	$PM_{2.5}$	117		n/a	none	40.6		11.2		Yes
	Pb-TSP	97.8		n/a	none	28.9		10.0		Yes
ESC	O_3	n/a	none	n/a	none	35.4	>10	95.4	2,500	Yes
	NO_2									
	CO									
	PM_{10}	n/a		n/a	none	35.7		98.7		Yes
	$PM_{2.5}$	n/a		n/a	none	39.9		99.5		Yes
	*$PM_{2.5}$	n/a		n/a	none	37.9		95.8		No

* non-FEM BAM n/a= not applicable est= estimate

Table 1.2c Probe Inlet Summary (concluded)

(Measurements are in meters)		Spacing from minor sources	Source	Spacing from obstructions	Obstruction	Spacing from trees		Probe inlet distance from traffic lane	AADT	Data compared to NAAQS
						Actual	Required			
KVR	O_3	n/a	none	n/a	none	none	>10	144.9	11,000	Yes
	NO_2									
	PM_{10}	n/a	none	n/a	none	none		138.5		Yes
	$PM_{2.5}$	n/a	none	n/a	none	none		140.3		Yes
CRQ	Pb-TSP	126	Airport runway (major source)	n/a	none	10	>10	n/a	n/a	Yes
SAY	*$PM_{2.5}$	19	Port of entry (major source)	n/a	none	none	>10	19	31,252	No

* non-FEM BAM n/a= not applicable est= estimate

Table 1.3 Individual Site Assessment Summary

Site Name	Abbrev-iation	Year	Comments/Issues	Cost to Move? (High/Avg/Low)	Moved Recently? (Yes/No)
Alpine	ALP	2015	O3 Design Value site; just relocated	High	Yes
Camp Pendleton	CMP	1997	Extremely difficult to obtain military consent to relocate elsewhere on CMP property	Avg	No
Chula Vista	CVA	1974	Highest rate of asthma in the County; must renovate the deck	High	No
Del Mar	DMR	1983	This area and the areas north and south of this site are the most expensive land in the County	Very High	No
Donovan	DVN	2014	Otay Mesa border crossing; just relocated	High	Yes
Rancho Carmel Dr.	RCD	2015	Federally required	Avg	Yes
El Cajon	ECA	1981	The station relocated about 271 meters southwest of its original location in 2015; NCore site	High	Yes
Escondido	ESC	1973	High NO2 and PM2.5 site	High	No
Kearny Villa Rd	KVR	2010	Secondary business district area; recently relocated	High	Yes
Palomar Airport	CRQ	2014	Federally required	Low	Yes
San Ysidro	SAY	2015	Just a BAM enclosure; not a full station	Very Low	Yes

Chapter 2 Population Trends

Section 2.0.0 Population of San Diego

Over the years, the District's air monitoring network has evolved to its current state based on several factors:

- meteorology,
- topography,
- pollutant(s) being measured,
- monitor area(s) represented, and
- population centers/changes/shifts.

The monitoring stations are situated in the highest population areas that are far enough from another station to register different concentrations and different influences. The average distance between stations is approximately 12 miles for stations south of Interstate 8 and approximately 20 miles for stations north of Interstate 8.

Table 2.1 lists the most recent (2010) population trends in the County, according to the San Diego Association of Governments (SANDAG), and compares them against 2000 data.

Table 2.1 San Diego County Population Trends 2010 vs. 2000

City/Community	Population	Trend	Comments
Carlsbad	105,000	35%	Lead monitoring at Palomar Airport
Chula Vista	244,000	41%	Has an ambient station
Coronado	25,000	2%	
Del Mar	4,000	-5%	Has an ambient station
El Cajon	100,000	5%	Has the NCore station
Encinitas	59,000	3%	
Escondido	144,000	8%	Has an ambient station
Imperial Beach	26,324	-2%	
La Mesa	57,000	4%	
Lemon Grove	25,000	2%	
National City	59,000	8%	
Oceanside	167,000	4%	Has an ambient station in Camp Pendleton
Poway	48,000	0%	Has the Near-road station
San Diego	**1,302,000**	**6% Overall**	**Has ambient stations at Downtown-Barrio Logan and Kearny Villa Road and $PM_{2.5}$ monitoring at San Ysidro**
Barrio Logan	51,000	7.1%	
Kearny Mesa	74,000	6.7%	
San Ysidro	30,000	9%	
San Marcos	84,000	52%	
Santee	53,000	1%	
Solana Beach	13,000	-1%	
Vista	94,000	4%	
Unincorporated	**487,000**	**4% Overall**	**Has ambient stations at Alpine and Otay Mesa**
Alpine	14,000	14%	
Otay Mesa	69,000	41%	
Region (overall)	**3,100,000**	10%	

Section 2.1.0 Air Monitoring Network with Respect to Population Centers

Each city/community is reviewed for industrial and population growth to determine if a new ambient air monitoring station should be placed there or if a close-by one should be relocated. If coverage can be determined by interpreting the data from two adjacent stations, then the city/community is deemed as covered by the ambient air quality monitoring network.

Carlsbad

This community is one of the faster growing areas in the county. It is located approximately midway between the Camp Pendleton and Del Mar stations. The Camp Pendleton and Del Mar stations are in place to measure, primarily, ozone transport from the South Coast Air Basin. Carlsbad and the adjacent cities/communities are covered by the Camp Pendleton and Del Mar stations.

Chula Vista

This city is the second fastest growing area in San Diego and second only to the City of San Diego for total population. An ambient air monitoring station is already in place. This population and the adjacent cities/communities are covered by our ambient air monitoring network.

Coronado

This population is covered by our Downtown station, which is located across the bay from Coronado.

Del Mar

The station was sited to gather information on pollutant transport from the South Coast Air Basin that the monitors at Camp Pendleton do not register. This population and the adjacent cities/communities are covered by our ambient air monitoring network.

El Cajon

The station in El Cajon supports both the National Core (NCore) and Photochemical Assessment Monitoring Stations (PAMS) programs. This population and the adjacent cities/communities are covered by our ambient air monitoring network.

Encinitas

This city is south of Carlsbad and just north of Del Mar. Encinitas and the adjacent cities/communities are covered by the Camp Pendleton and Del Mar stations.

Escondido

This city is one of the largest in the County. An ambient air monitoring station is already in place. It is located in a borderline Environmental Justice zone. This population and the adjacent cities/communities are covered by our ambient air monitoring network.

Imperial Beach

This city is located south of the Chula Vista air monitoring station and west of the Otay Mesa air monitoring station. Imperial Beach and the adjacent cities/communities are covered by the Chula Vista and Otay Mesa stations.

La Mesa

This city is east of the Kearny Villa Road station and just west of the El Cajon station. La Mesa and the adjacent cities/communities are covered by the Kearny Villa Road and El Cajon stations.

Lemon Grove
This city is east of the Downtown station and west of the El Cajon station. Lemon Grove and the adjacent cities/communities are covered by the Downtown and El Cajon stations.

National City
This city is south of the Downtown station and north of the Chula Vista station. National City and the adjacent cities/communities are covered by the Downtown and Chula Vista stations.

Oceanside
This city is the second biggest in the County. An ambient air monitoring station is already in place at Camp Pendleton. This population and the adjacent cities/communities are covered by our ambient air monitoring network.

Poway
A Near-road monitoring station is in place. Additionally, the Kearny Villa Road and Escondido stations are located south and north of Poway, respectively. Poway and the adjacent cities/communities are covered by the Escondido, Kearny Villa Road, and Rancho Carmel Drive stations.

San Diego
The City of San Diego is the largest city in the County, and it encompasses approximately 370 square miles. The bulk of the population is west of the El Cajon-Santee, south of Escondido-Camp Pendleton, and north of Chula Vista-Otay Ranch cities/communities. Immediately south of Downtown San Diego is the community of Barrio Logan and this is where an ambient air monitoring station is located. There is the Kearny Villa Road station in the approximate middle of the ring of cities/communities mentioned above.

San Marcos
This community has the fastest growing population base in the County. This city is east of the Camp Pendleton station and west of the Escondido station. San Marcos and the adjacent cities/communities are covered by the Camp Pendleton and Escondido stations.

Santee
This city is east of the Kearny Villa Road station and northwest of the El Cajon station. Santee and the adjacent cities/communities are covered by the Kearny Villa Road and El Cajon stations.

Solana Beach
This city is south of Carlsbad and just north of Del Mar. Solana Beach and the adjacent cities/communities are covered by the Camp Pendleton and Del Mar stations.

Vista
This city is east of the Camp Pendleton station and west of the Escondido station. Vista and the adjacent cities/communities are covered by the Camp Pendleton and Escondido stations.

Unincorporated Areas-South County
This area has the Otay Mesa ambient air monitoring station. This area is southeast of the Chula Vista and Downtown monitoring stations. Otay Mesa and the adjacent cities/communities are covered by the Otay Mesa and Chula Vista monitor stations.

Unincorporated Areas-East County
This area has the Alpine ambient air monitoring station. This area is east of El Cajon. Alpine and the adjacent cities/communities are covered by the station in place.

Unincorporated Areas-North County
This area includes the Bonsall, Fallbrook, Hidden Meadows, and Pala region. These areas are north of the Escondido station and south of three stations from the South Coast Air Quality Management District (SCAQMD). The Unincorporated Areas in North County are covered by the District's Escondido station and the SCAQMD stations.

Section 2.2.0 Network Design History

Over the years, several studies have been performed by District personnel in locations throughout the SDAB to ascertain the viability of the network with regards to the criteria pollutants. The results of those studies and the decisions based on them are how the Network has evolved over the years to its current state of coverage. In addition, some stations have relocated within a community or city due to tenancy issues, such as redevelopment or lease expiration.

The community of Alpine in the foothills east of San Diego traditionally records the highest ozone readings in the network due to its location downwind of the populated areas of the County and the topography. In 1989, the District performed an ozone study 20 miles east of the Alpine station at a Caltrans maintenance facility off State Route 80 in the town of Descanso. The values recorded at the Descanso location were the same as those recorded at the Alpine location but with a 1-2 hour time lag depending upon the weather conditions. Because the values at the Descanso location would not add any substantial information to the network, the District discontinued the study.

The District also performed an ozone study in the community of Ramona. The city of Ramona is approximately 20 miles northwest of Alpine and 15 miles east-southeast of Escondido. It is also mid-elevation between the Escondido and Alpine locations. The values recorded in the Ramona study were essentially the average of the values between Alpine and Escondido. Because the values at the Ramona location could be interpolated between the Alpine and Escondido monitors, the Ramona location was discontinued, and no further monitoring was conducted.

Additional studies were performed to determine if the District needed to increase monitoring within the network. Such studies were conducted in Chollas Heights (five miles northeast of the Downtown location and 10 miles southwest of the El Cajon location) and the northern area of downtown San Diego (2.5 miles north of the current Downtown station location). Both locations showed equivalent numbers to the Downtown San Diego (south) monitor; therefore, the studies were discontinued, and no further monitoring was performed.

Lastly, a study was performed to determine if the District needed to expand the network along the southwest quadrant of the air basin. An ozone monitor was placed in the community of Imperial Beach, approximately 15 miles southwest of the old Downtown San Diego monitor. The numbers collected there directly coincided with the values collected at the old Downtown San Diego monitor location; therefore, the study was discontinued, and no further monitoring was performed.

Section 2.3.0 Network Station Rating Based on Population

Table 2.2 is the ratings for the current ambient air monitoring stations with respect to the population of the area in which the station is located and taking into account the population of adjacent cities.

Table 2.2 Population Ranking

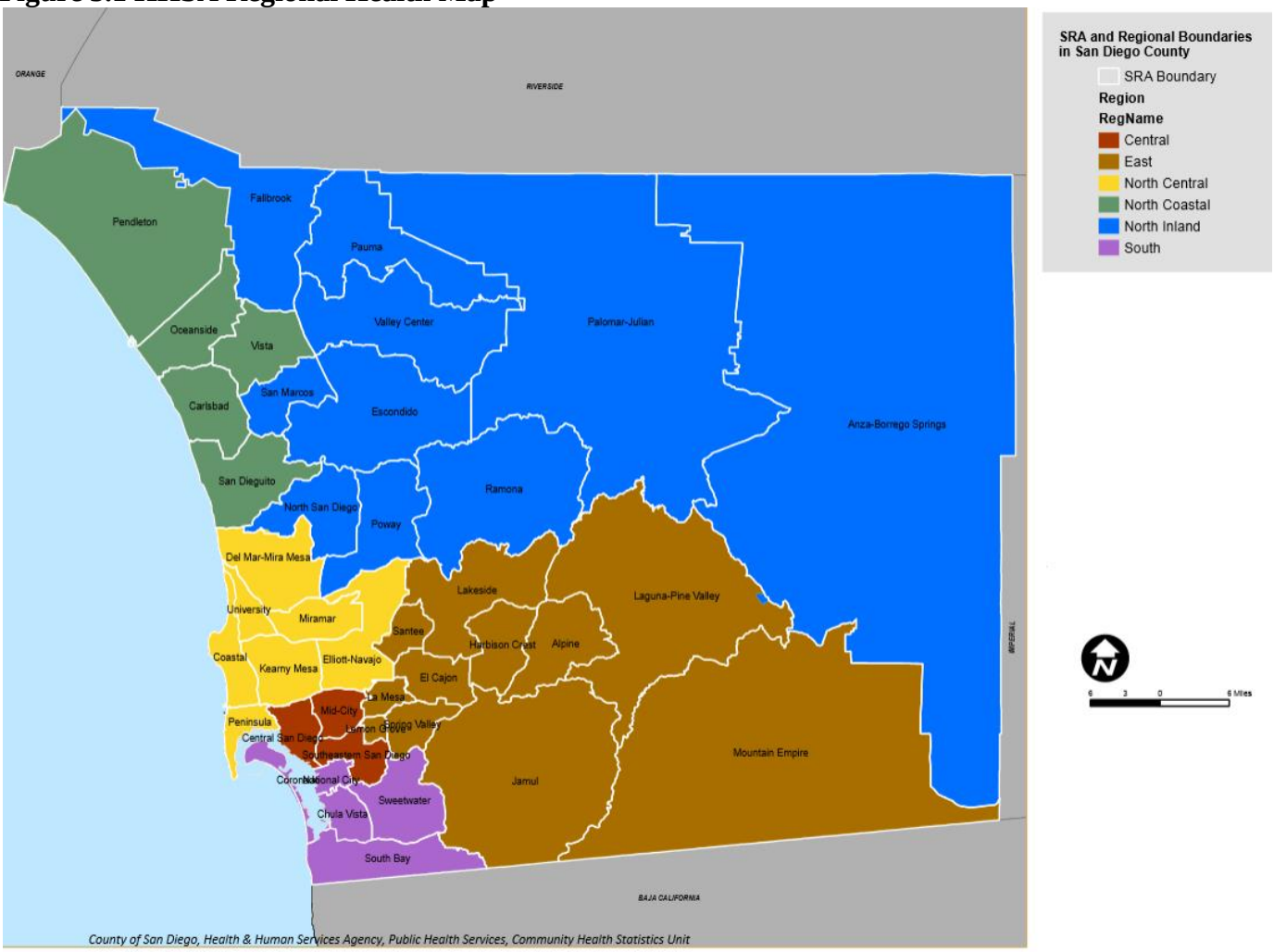
	Overall Scoring	COMMENTS
Alpine (ALP)	**2**	**Based on total population and population growth**
Harbison Canyon		
Descanso		
Camp Pendleton (CMP)	**10**	**Based on total population and surrounding population**
Oceanside		
Carlsbad		
Encinitas		
San Marcos		
Chula Vista (CVA)	**8**	**Based on total population and population growth**
Bonita		
Castle Park		
Imperial Beach		
San Ysidro		
Del Mar (DMR)	**0**	**Low population and low population growth**
Solana Beach		
La Jolla		
Sorrento Valley		
Fairbanks Ranch		
Rancho Santa Fe		
Otay Mesa-Donovan (DVN)	**7**	**Based on total population and population growth**
Otay Mesa-West		
Otay Mesa-East		
San Ysidro		
El Cajon-Floyd Smith Dr. (FSD)	**7**	**Based on total population and surrounding population**
La Mesa		
Santee		
Lakeside		
Casa de Oro		
Lemon Grove		
Spring Valley		
Escondido (ESC)	**8**	**Based on total population and surrounding population**
Vista		
Bonsall		
Fallbrook		
Poway		
Valley Center		
Pala		
San Diego-Beardsley (DTN)	**10**	**Based on total population and surrounding population**
Logan Heights		
Grant Hill		
East Village		
Sherman Heights		
Mountain View		
National City		
Downtown San Diego		
San Diego-Kearny Villa Rd. (KVR)	**6**	**Based on total population and surrounding population**
Tierrasanta		
Clairemont Mesa		
Mira Mesa		
Serra Mesa		
Scripps Ranch		
San Ysidro (SAY)	**7**	**If it becomes a full station**
Rancho Carmel Dr (RCD)	**10**	**Highest trafficked area**
2nd Near-road	**9**	**Required; Environmental Justice area**

Chapter 3 Health Statistics

Section 3.0.0 Health Statistics for the County and Health Risk Summary

The County Department of Health and Human Services (HHSA) breaks down health statistics by region (Figure 3.1). A myriad of health statistics are detailed and discussed. For the purposes of the Network Assessment, greater weight will be given to those health issues more closely associated with air pollution: asthma, heart disease, and chronic obstructive pulmonary disease (COPD). Less weight will be given to cancer, neurological, and low birth weight issues, because less is known about their air pollution influence(s).

Figure 3.1 HHSA Regional Health Map



The EPA-Region 9 health risk mapping tool, CalEnviro 2.0, breaks down the health statistics by city block, and the EPA-National mapping database tool, EJ View, breaks down the health statistics by wherever the cursor is placed. EJ View combines all respiratory ailments into one category called Respiratory Risk and ranks accordingly (the higher the number, the higher the risk). Please note there is no coronary risk in EJView.

Table 3.1 is a summary of the tabulations from sections 3.1.1.1-3.1.6. A higher number indicates a worse situation (10 being the maximum).

Table 3.1 Health Risk Summary by Stations in the Network

	Health Scoring	COMMENTS	1. NATA Asthma	2. EJView Respiratory	3. CalEnviroS Asthma	4. HHSA Asthma	5. HHSA COPD	6. HHSA Coronary
Alpine (ALP)	**6**	**The HHSA numbers are very high**	**45**	**3.3**	**13**	**5**	**6**	**5**
Harbison Canyon			49	1.6	22	5	6	5
Descanso			36	1.0	16	5	6	5
Camp Pendleton (CMP)	**3**	**Surrounding areas have middle rates**	**42**	**1.6**	**0**	**1**	**1**	**2**
Oceanside			62	4.4	34	1	1	2
Carlsbad			59	5.4	19	1	1	2
Encinitas			53	3.0	4	1	1	2
San Marcos			70	3.5	13	1	1	2
Chula Vista (CVA)	**9**	**Very high rates for this location/station and the surrounding area**	**69**	**3.8**	**72**	**4**	**5**	**6**
Bonita			67	3.0	57	4	5	6
Castle Park			69	3.9	62	4	5	6
Imperial Beach			60	3.7	66	4	5	6
San Ysidro			89	5.3	66	4	5	6
Del Mar (DMR)	**1**	**Lowest rates in the County & surrounding areas are low**	**59**	**2.6**	**1**	**2**	**2**	**1**
Solana Beach			51	3.0	1	2	2	1
La Jolla			46	3.3	2	2	2	1
Sorrento Valley			73	2.4	2	2	2	1
Fairbanks Ranch			47	2.2	3	2	2	1
Rancho Santa Fe			78	2.7	3	2	2	1
Otay Mesa-Donovan (DVN)	**6**	**Fairly high rates for this location/station and the surrounding area**	**64**	**4.9**	**54**	**4**	**5**	**6**
Otay Mesa-West			70	3.2	54	4	5	6
Otay Mesa-East			64	4.9	54	4	5	6
San Ysidro			89	5.3	66	4	5	6
El Cajon-Floyd Smith Dr. (FSD)	**8**	**High rates for this station and the surrounding areas**	**70**	**3.6**	**77**	**5**	**6**	**5**
La Mesa			71	4.7	42	5	6	5
Santee			58	2.5	38	5	6	5
Lakeside			57	2.4	38	5	6	5
Casa de Oro			72	4.1	82	5	6	5
Lemon Grove			70	3.6	83	5	6	5
Spring Valley			69	3.6	92	5	6	5
Escondido (ESC)	**6**	**High EPA rates for this station and the surrounding area**	**68**	**3.5**	**49**	**3**	**3**	**4**
Vista			68	3.3	30	3	3	4
Bonsall			64	2.1	19	3	3	4
Fallbrook			61	2.2	21	3	3	4
Poway			83	2.9	15	3	3	4
Valley Center			59	2.0	27	3	3	4
Pala			66	1.7	27	3	3	4
SD-Beardsley (DTN)	**10**	**Highest rates in the County and the surrounding area**	**97**	**5.2**	**89**	**6**	**4**	**3**
Logan Heights			103	5.3	92	6	4	3
Grant Hill			96	4.9	86	6	4	3
East Village			96	5.2	87	6	4	3
Sherman Heights			124	5.7	90	6	4	3
Mountain View			97	4.0	91	6	4	3
National City			75	4.6	84	4	5	6
Downtown San Diego			135	5.9	87	6	4	3
SD-Kearny Villa Rd. (KVR)	**4**	**Slightly lower than average rates for EPA and excellent for HHSA**	**55**	**3.1**	**10**	**2**	**2**	**1**
Tierrasanta			64	2.8	7	2	2	1
Clairemont Mesa			69	4.3	51	2	2	1
Mira Mesa			60	2.8	22	2	2	1
Serra Mesa			87	7.3	51	2	2	1
Scripps Ranch			73	2.4	7	2	2	1
San Ysidro (SAY)	**6**		**89**	**5.3**	**66**	**4**	**5**	**6**
Rancho Carmel Dr (RCD)	**6**		**83**	**2.9**	**15**	**3**	**3**	**4**
2nd Near-road	**10**	**Logan Heights**	103	5.3	92	6	4	3
Palomar Airport (CRQ)	**5**		70	3.5	13	1	1	2

Section 3.1.0 Health Statistics by Region/City/Community/Station

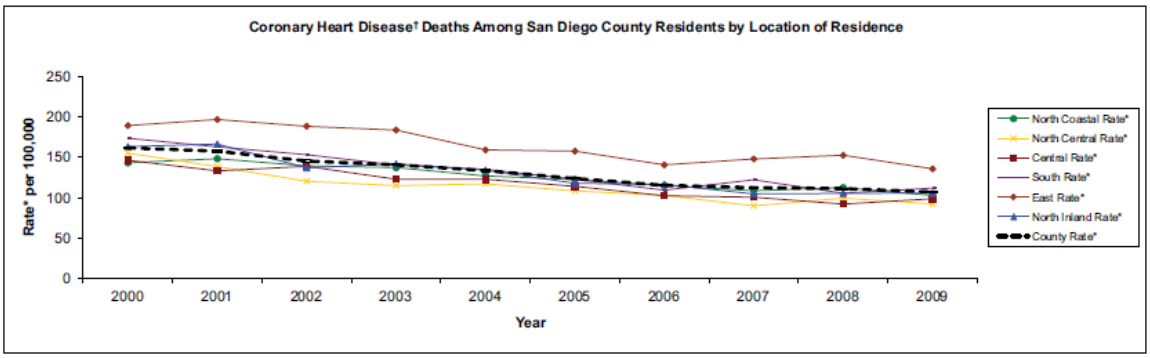
This section delineates the health issues by region/city/community. The data from this section will be used to grade the individual ambient air monitoring stations.

Section 3.1.1 Coronary Issues by Region

Figure 3.2 includes graphs provided by HHSA that illustrate the regional trends with respect to coronary health. Table 3.1 & column 6 shows the scores of the stations according to HHSA statistics and groups the stations according to the region (ranking 1-6, with 6 as the worst) from Figure 3.2 (averaged from 2000-2009).

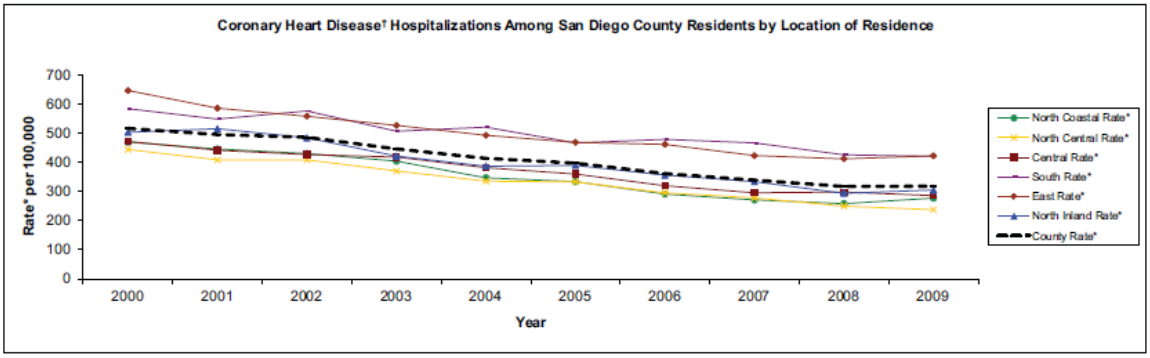
Figure 3.2 Coronary Issues by Region According to HHSA

Death Certificate



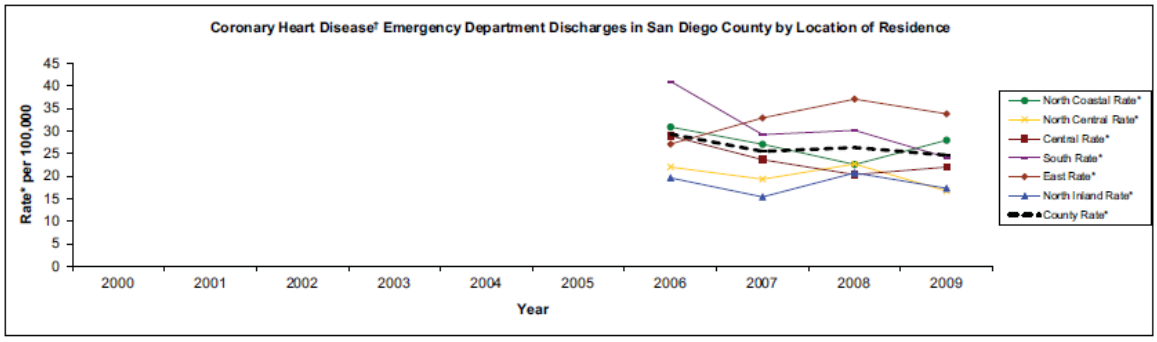
* Rates per 100,000 population.
† Coronary Heart Disease death refers to (underlying cause of death) ICD-10 codes I11, I20-I25.
§ Rates not calculated for fewer than 5 events. Rates not calculated in cases where zip code is unknown.
Source: Death Statistical Master Files (CA DPH), County of San Diego, Health & Human Services Agency, Epidemiology & Immunization Services Branch; SANDAG, Current Population Estimates, 10/2010.
Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 01/12/2012.

Hospital



* Rates per 100,000 population.
† Coronary Heart Disease hospitalization refers to (principal diagnosis) ICD-9 codes 402, 410-414, 429.2.
§ Rates not calculated for fewer than 5 events. Rates not calculated in cases where zip code is unknown.
Source: Patient Discharge Data, (CA OSHPD), County of San Diego, Health & Human Services Agency, Epidemiology & Immunization Services Branch; SANDAG, Current Population Estimates, 01/12/2012.
Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 01/12/2012.

Emergency Department



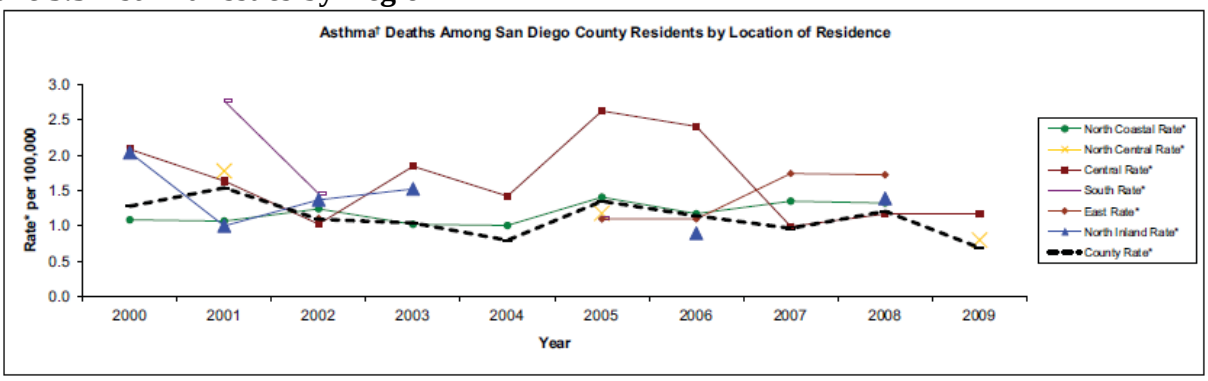
* Rates per 100,000 population.
† Coronary Heart Disease emergency department discharge refers to (principal diagnosis) ICD-9 codes 402, 410-414, 429.2
** New database; 2006 is first calendar year regional data is available
§ Rates not calculated for fewer than 5 events. Rates not calculated in cases where zip code is unknown.
Source: HASD&IC, CHIP, County of San Diego, Health & Human Services Agency, Emergency Medical Services, Emergency Department Database; SANDAG, Current Population Estimates, 10/2010.
Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 01/12/2012.

Section 3.1.2 Asthma Issues by Region

Figure 3.3 includes graphs provided by HHSA that illustrate the regional trends with respect to asthma issues. Table 3.1 & column 4 shows the scores of the stations according to HHSA statistics and groups the stations according to the region (ranking 1-6, with 6 as the worst) from Figure 3.2 (averaged from 2000-2009).

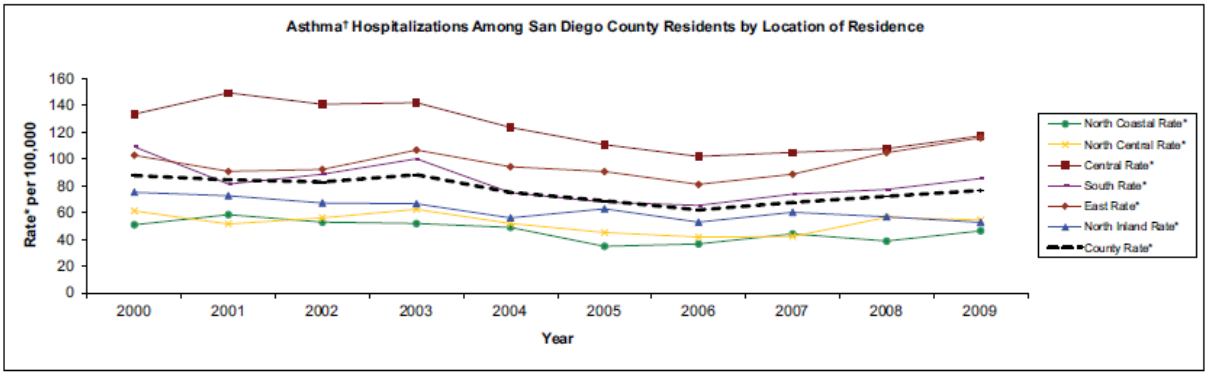
Figure 3.3 Asthma Issues by Region

Death Certificate



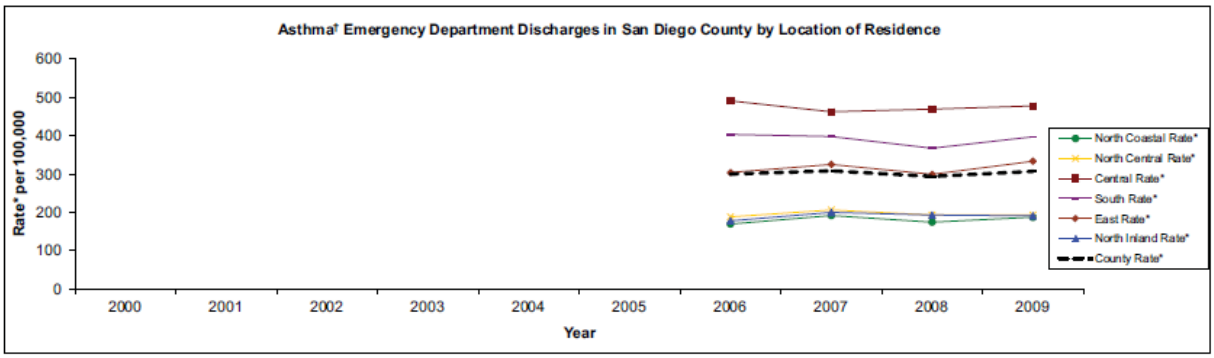
* Rates per 100,000 population.
† Asthma death refers to (underlying cause of death) ICD-10 codes J45-J46
§ Rates not calculated for fewer than 5 events. Rates not calculated in cases where zip code is unknown.
Source: Death Statistical Master Files (CA DPH), County of San Diego, Health & Human Services Agency, Epidemiology & Immunization Services Branch; SANDAG, Current Population Estimates, 10/2010.
Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 01/12/2012.

Hospital



* Rates per 100,000 population.
† Asthma hospitalization refers to (principal diagnosis) ICD-9 code 493
§ Rates not calculated for fewer than 5 events. Rates not calculated in cases where zip code is unknown.
Source: Patient Discharge Data, (CA OSHPD), County of San Diego, Health & Human Services Agency, Epidemiology & Immunization Services Branch; SANDAG, Current Population Estimates, 01/12/2012.
Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 01/12/2012.

Emergency Department



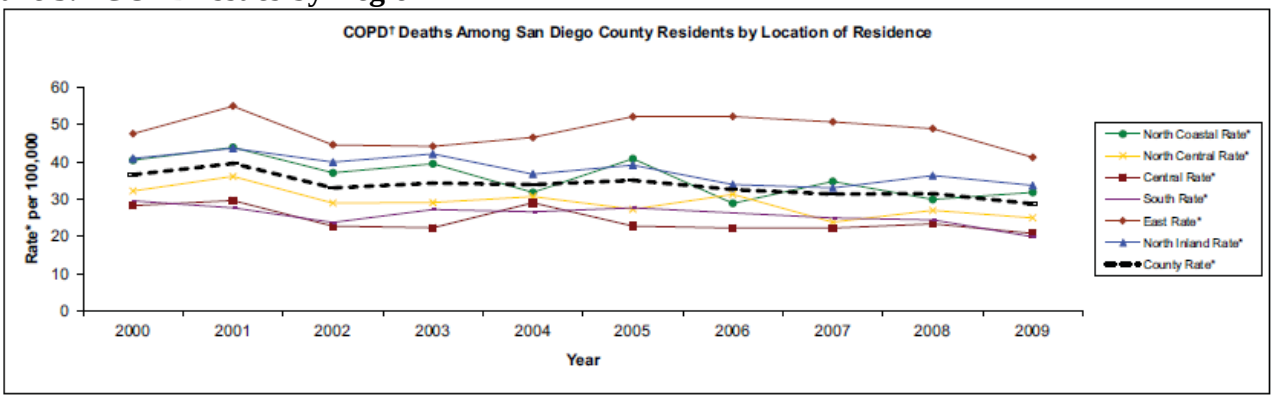
* Rates per 100,000 population.
† Asthma emergency department visit refers to (principal diagnosis) ICD-9 code 493
** New database; 2006 is first calendar year regional data is available
§ Rates not calculated for fewer than 5 events. Rates not calculated in cases where zip code is unknown or outside San Diego County.
Source: HASD&IC, CHIP, County of San Diego, Health & Human Services Agency, Emergency Medical Services, Emergency Department Database; SANDAG, Current Population Estimates, 10/2010.
Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 01/12/2012.

Section 3.1.3 COPD Issues by Region

Figure 3.4 includes graphs provided by HHSA that illustrate the regional trends with respect to COPD issues. Table 3.1 & column 4 shows the scores of the stations according to HHSA statistics and groups the stations according to the region (ranking 1-6, with 6 as the worst) from Figure 3.2 (averaged from 2000-2009).

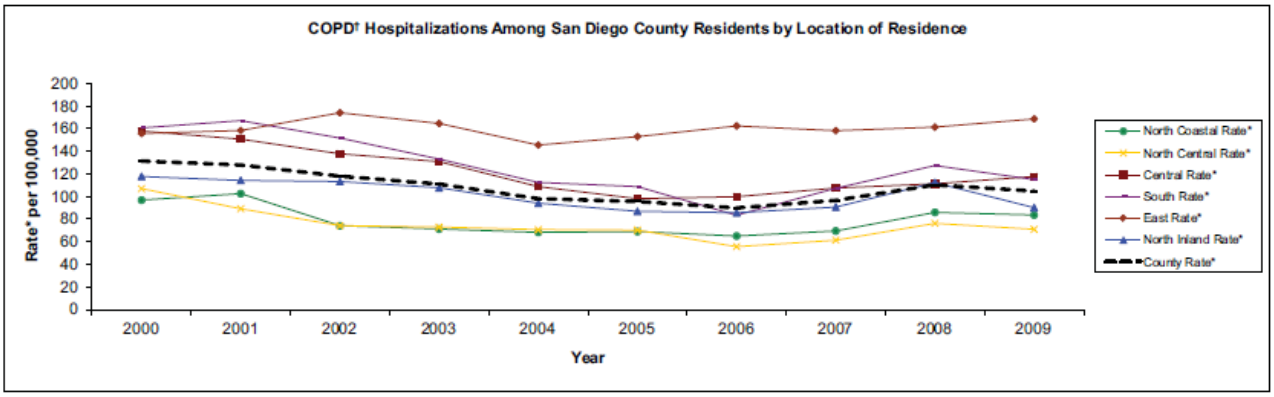
Figure 3.4 COPD Issues by Region

Death Certificate



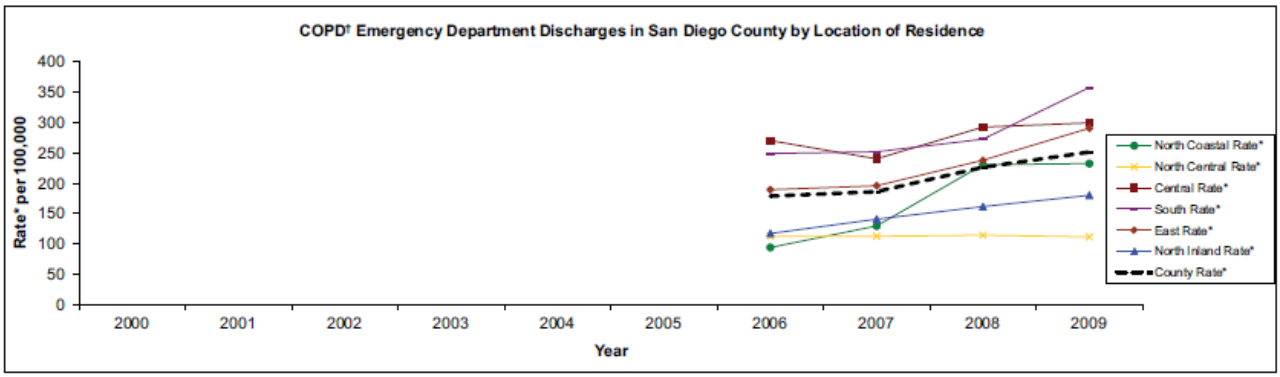
* Rates per 100,000 population.
† COPD death refers to (underlying cause of death) ICD-10 codes J40-44.
§ Rates not calculated for fewer than 5 events. Rates not calculated in cases where zip code is unknown.
Source: Death Statistical Master Files (CA DPH), County of San Diego, Health & Human Services Agency, Epidemiology & Immunization Services Branch; SANDAG, Current Population Estimates, 10/2010.
Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 01/12/2012.

Hospital



* Rates per 100,000 population.
† COPD hospitalization refers to (principal diagnosis) ICD-9 codes 490-492, 496.
§ Rates not calculated for fewer than 5 events. Rates not calculated in cases where zip code is unknown.
Source: Patient Discharge Data, (CA OSHPD), County of San Diego, Health & Human Services Agency, Epidemiology & Immunization Services Branch; SANDAG, Current Population Estimates, 01/12/2012.
Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 01/12/2012.

Emergency Department



* Rates per 100,000 population.
† COPD emergency department visit refers to (principal diagnosis) ICD-9 code 490-492, 496.
** New database; 2006 is first calendar year regional data is available
§ Rates not calculated for fewer than 5 events. Rates not calculated in cases where zip code is unknown or outside San Diego County.
Source: HASD&IC, CHIP, County of San Diego, Health & Human Services Agency, Emergency Medical Services, Emergency Department Database; SANDAG, Current Population Estimates, 10/2010.
Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 01/12/2012.

Section 3.1.4 Respiratory Risk by City/Community/Station

The EPA program, EJView, combines all respiratory ailments and creates a risk factor to rank the area (unlike the HHSA report there are no graphs to display). A higher number (10 being the maximum) indicates a higher risk factor. Table 3.1 & column 2 tabulates respiratory issues by the city or community in which an ambient air monitoring station is located and the surrounding city or community.

Section 3.1.5 Asthma Risk by City/Community/Station

Table 3.1 & column 3 tabulates asthma rate using EPA-Region 9's Environmental Justice mapping tool, CalEnviroScreen. A higher number (100 being the maximum) indicates a higher risk factor.

Section 3.1.6 Total Health Risk by City/Community/Station

Table 3.1 & column 1 tabulates all health issues with respect to the chemicals prevalent in the area of concern. The health risks are listed by the city or community in which an ambient air monitoring station is located and the surrounding city or community. The health risk ratings listed (100 being the maximum) are from the National-Scale Air Toxics Assessment (NATA) database. A higher number indicates a higher risk factor.

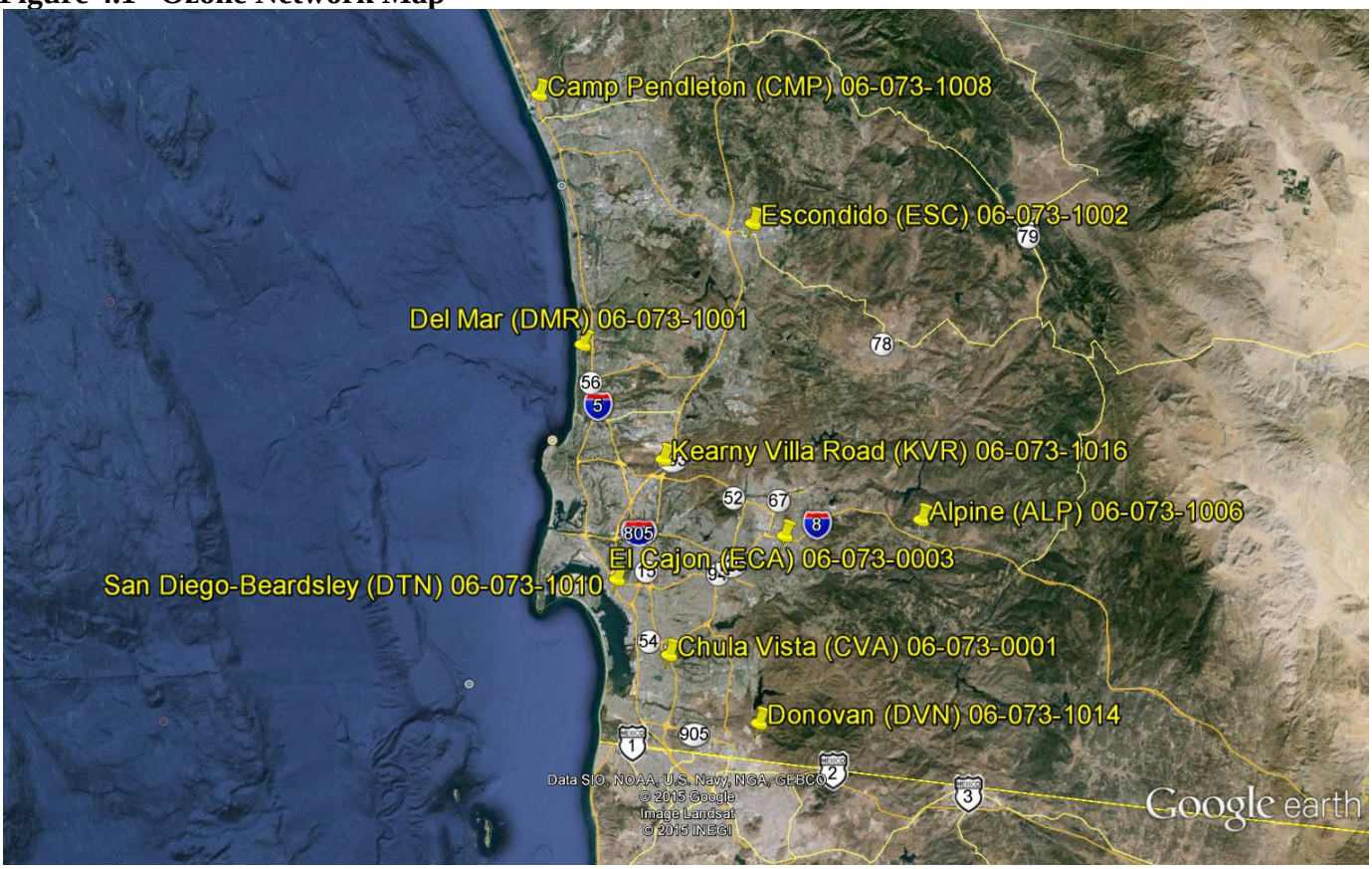
Chapter 4 Ozone (O_3)

Section 4.0.0 Ozone - Introduction

Ambient level ozone was sampled on a continuous (7/24) basis at locations throughout the SDAB/(Figure 4.1). The network has had recent station moves:

- The Otay Mesa (OTM) station was permanently relocated to the Donovan State Prison area, and this station is called Donovan (DVN).
- The El Cajon-Redwood Ave (ECA) station was temporarily relocated to the Gillespie Field area off of Floyd Smith Drive (FSD).
- The Kearny Mesa-Overland (KMA) station relocated to Kearny Villa Rd (KVR).

Figure 4.1 Ozone Network Map



The reported concentrations reflect a mix of the two station moves listed above. Because the Donovan relocation is permanent, the map and table parameters reflect the new site metadata (labeled as DVN). Because the Floyd Smith Drive relocation is temporary, the maps and table parameters reflect the permanent site metadata (labeled as ECA). The Kearny Mesa-Overland (KMA) station permanently relocated to its current location at Kearny Villa Rd. (KVR) and the parameters are an aggregate of the two stations.

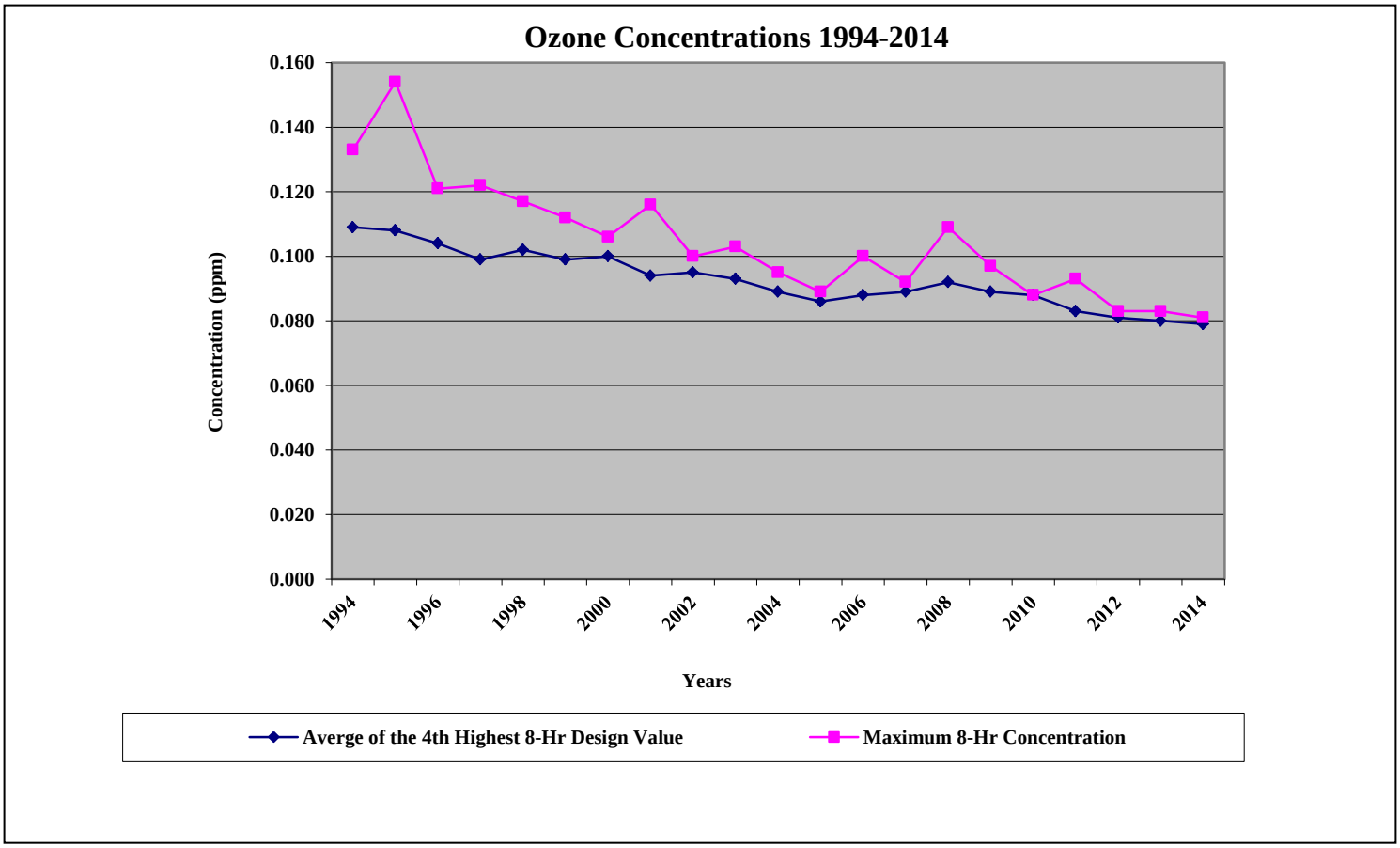
Section 4.1.0 Ozone - Trends in the SDAB

Over the years, the SDAB has seen a decrease in ozone levels (Table 4.1 and Figure 4.2). Over the last several years, San Diego realized a significant decrease in the 3-yr average of the exceedance days for ozone and has seen a sharp decrease in its 8-hour Design Value since 1990. Note that the "Days above the National 8-Hr Standard" row in Table 4.1 reflects the ozone standard for that year.

Table 4.1 Summary of Ozone Concentrations, 1994-2014

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Average of the 4th Highest 8-Hr Design Value (ppm)	0.109	0.108	0.104	0.099	0.102	0.099	0.100	0.094	0.095	0.093	0.089	0.086	0.088	0.089	0.092	0.089	0.088	0.083	0.081	0.080	0.079
Maximum 8-Hr Concentration (ppm)	0.133	0.154	0.121	0.122	0.117	0.112	0.106	0.116	0.100	0.103	0.095	0.089	0.100	0.092	0.109	0.097	0.088	0.093	0.083	0.083	0.081
Days above the National 8-Hr Standard (#)	90	94	64	43	58	44	46	43	31	38	23	24	38	27	35	24	14	10	10	7	12

Figure 4.2 Ozone Concentrations, 1994-2014



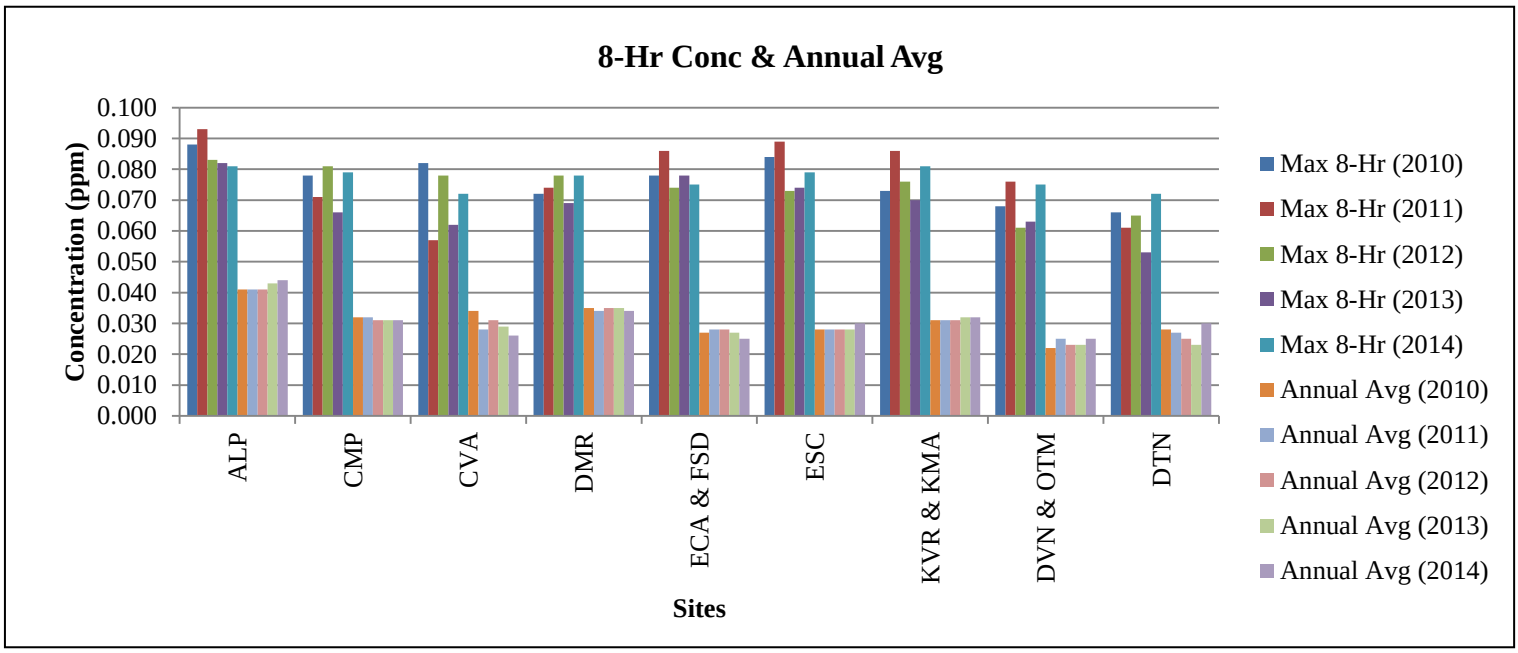
Section 4.1.1 Ozone Measurements by Site, 2010-2014

Table 4.2a lists the maximum ozone measurement for each ozone monitoring location by year. Figure 4.3 show the data graphically.

Table 4.2a Ozone Measurements by Site, 2010-2014

Site (name)		Maximum Concentration for 8-Hrs (ppm)					Annual Average (ppm)				
		2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
Alpine	ALP	0.088	0.093	0.083	0.082	0.081	0.041	0.041	0.041	0.043	0.044
Camp Pendleton	CMP	0.078	0.071	0.081	0.066	0.079	0.032	0.032	0.031	0.031	0.031
Chula Vista	CVA	0.082	0.057	0.078	0.062	0.072	0.034	0.028	0.031	0.029	0.026
Del Mar	DMR	0.072	0.074	0.078	0.069	0.078	0.035	0.034	0.035	0.035	0.034
El Cajon	ECA & FSD	0.078	0.086	0.074	0.078	0.075	0.027	0.028	0.028	0.027	0.025
Escondido	ESC	0.084	0.089	0.073	0.074	0.079	0.028	0.028	0.028	0.028	0.030
Kearny Villa Road	KVR & KMA	0.073	0.086	0.076	0.070	0.081	0.031	0.031	0.031	0.032	0.032
Otay Mesa	DVN & OTM	0.068	0.076	0.061	0.063	0.075	0.022	0.025	0.023	0.023	0.025
San Diego-Beardsley	DTN	0.066	0.061	0.065	0.053	0.072	0.028	0.027	0.025	0.023	0.030

Figure 4.3 Graph of 8-Hr Concentration and Annual Average



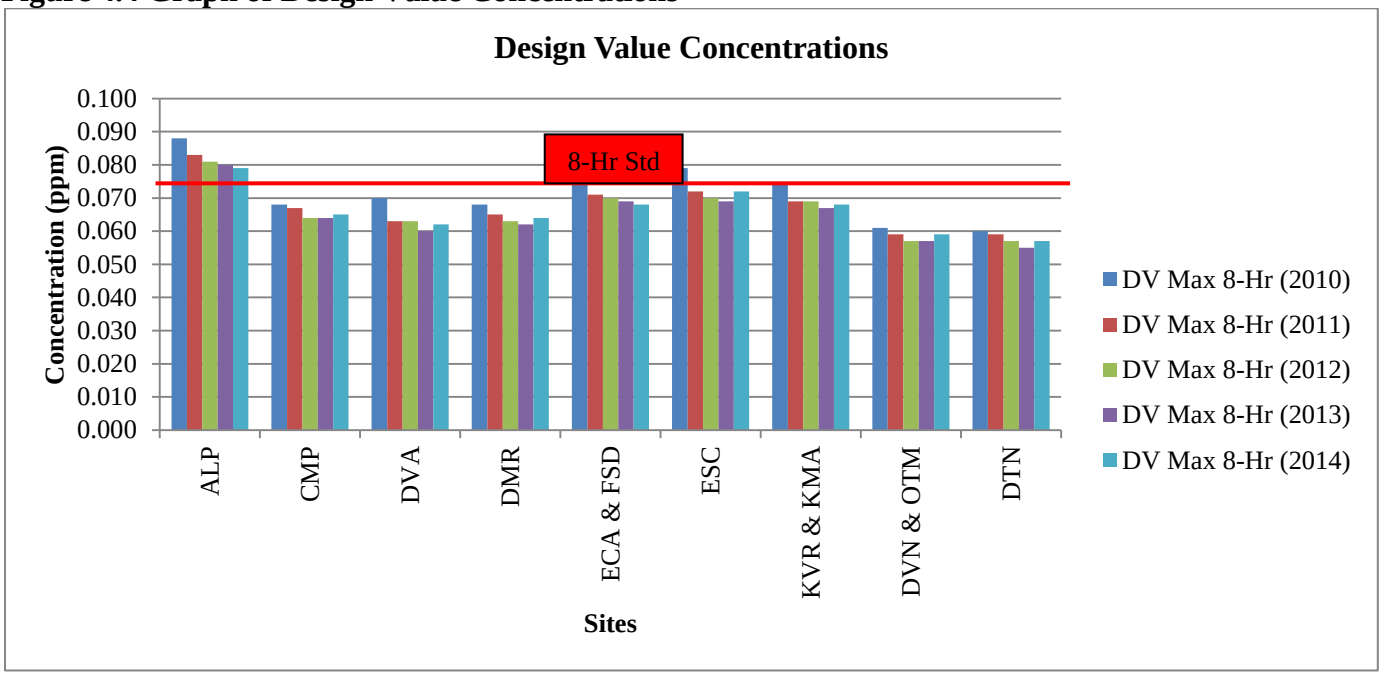
Section 4.1.2 Ozone Measurements by Site, Design Values

Table 4.2b lists the maximum ozone measurement for each ozone monitoring location. Figure 4.4 show the data graphically with respect to the 8-Hr Standard for 2015 (0.075 ppm).

Table 4.2b Ozone Measurements by Site, Design Value

Site (name)		Design Value Maximum Concentration for 8-Hrs (ppm)				
		2008-2010	2009-2011	2010-2012	2011-2013	2012-2014
Alpine	ALP	0.088	0.083	0.081	0.080	0.079
Camp Pendleton	CMP	0.068	0.067	0.064	0.064	0.065
Chula Vista	CVA	0.070	0.063	0.063	0.060	0.062
Del Mar	DMR	0.068	0.065	0.063	0.062	0.064
El Cajon	ECA & FSD	0.075	0.071	0.070	0.069	0.068
Escondido	ESC	0.079	0.072	0.070	0.069	0.072
Kearny Villa Road	KVR & KMA	0.074	0.069	0.069	0.067	0.068
Otay Mesa	DVN & OTM	0.061	0.059	0.057	0.057	0.059
San Diego-Beardsley	DTN	0.060	0.059	0.057	0.055	0.057

Figure 4.4 Graph of Design Value Concentrations



Section 4.2.0 Ozone – Federal Design Criteria Requirements

Federal requirements for the number of ozone monitors are in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.1 "Ozone (O_3) Design Criteria".

Section 4.2.1 Ozone - Design Value Criteria

40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.1 "Ozone (O_3) Design Criteria", subsection 4.1(a) lists the requirements needed to fulfill the Ozone (O_3) Design Criteria. The 8-Hour Design Value is based on the monitor that records the highest values (Table 4.5c), using EPA *Table D-2* from section 4.2.0. Tables 4.4a and 4.4b list these requirements for the SDAB.

Table 4.3a Ozone 8-hour Design Value, 2012-2014

Maximum 8-Hr Design Value (ppm)	Is the Maximum 8-Hr Design Value ≥ 85% of the NAAQS? (yes/no)	Is the Maximum 8-Hr Design Value < 85% of the NAAQS? (yes/no)	Does the Maximum 8-Hr Design Value Meet the NAAQS? (yes/no)
0.079	Yes	No	No

Table 4.3b Ozone Minimum Number of Monitors (Sites) Needed for 2014

MSA (name)	County (name)	Population from 2010 Census (#)	Minimum Number of Monitors (Sites) Required (#)	Number of Active Monitors (Sites) (#)	Number of Monitors (Sites) Needed (#)
San Diego	San Diego	3.2 million	2	9	None

Section 4.2.2 Ozone - Maximum Concentration

40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.1 "Ozone (O_3) Design Criteria", subsection 4.1(b) lists the requirements needed to fulfill the Maximum Concentration Site, which is based on the monitor that records the maximum concentration values (Table 4.4c).

Table 4.3c Ozone Maximum Concentration Site, 2012-2014

Maximum 8-Hr Design Value (ppm)	Maximum 8-Hr Design Value Site (name)	Maximum 8-Hr Design Value Site AQS ID (#)
0.079	Alpine (ALP)	06-073-1006

Section 4.3.0 Ozone - Rating Summary

Table 4.4 is a summary of the District's ozone monitor rating for the network instruments after using the EPA's Network Assessment tools for ozone.

Table 4.4 Ozone Monitoring Station Summary

	Overall Scoring	COMMENTS	**1.** Correlation	**2.** Removal	**3.** Area Served	**4.** 65 ppb Threshold	**4.** 70 ppb Threshold	**4.** 75 ppb Threshold	**5.** Internal
Alpine (ALP)	**63**	**1&2**: Ozone required for PAMS and Design Value **3:** Based on total population and population growth **4:** All 3 Threshold scenarios: high probability of exceedances	10	10	2	75% = 8	65% = 7	60% = 6	20
Camp Pendleton (CMP)	**72**	**1&2:** Ozone required for PAMS and Transport site **3:** Based on total population and surrounding population **4:** 2 of 3 Threshold scenarios: high probability of exceedances	10	10	10	55% = 6	40% = 4	25% = 3	29
Chula Vista (CVA)	**71**	**1&2:** Some of the highest asthma rates in the County **3:** Based on total population and population growth **4:** 1 of 3: high probability, 1 of 3: below average probability, 1 of 3: almost zero probability	10	10	8	50% = 5	30% = 3	5%= 1	34
Del Mar (DMR)	**21**	**1&2:** Will leave a 40 mile gap if removed **3:** Based on total population and zero growth **4:** 2 of 3 Threshold scenarios: high probability of exceedances	3	0	0	55% = 6	40% = 4	10% = 1	7
Otay Mesa-Donovan (DVN)	**58**	**1& 2:** Farthest south, registers transport from Mexico **3:** Based on total population and population growth **4:** Threshold scenarios: 1 of 3: high probability, 1 of 3: below average probability, 1 of 3: almost zero probability	8	8	7	45% = 5	15% = 2	5%= 1	27
El Cajon (ECA)	**87**	**1&2:** Ozone required for PAMS and NCore **3:** Based on total population and surrounding population **4:** All 3 Threshold scenarios: high probability of exceedance	10	5	7	75% = 8	65% = 7	60% = 6	44
Escondido (ESC)	**68**	**1&2:** Used to interpolate data for the surrounding cities **3:** Based on total population and surrounding population **4:** 2 of 3 Threshold scenarios: high probability of exceedances	9	5	8	65% = 7	45% = 5	35% = 4	30
SD-Beardsley (DTN)	**72**	**1&2:** EJ location, some of the highest asthma rates **3:** Based on total population and surrounding population **4:** 3 of 3 Threshold scenarios: low probability of exceedances	8	8	10	35% = 4	10% = 1	5%= 1	40
SD-Kearny Villa Rd. (KVR)	**64**	**1&2:** Required for PAMS and registers Downtown emissions **3:** Based on total population and surrounding population **4:** 2 of 3 Threshold scenarios: high probability of exceedances	7	7	6	65% = 7	60% = 6	35% = 4	27

The highest ranked sites for retention are those stations and associated ozone monitors that have a specific program or purpose, e.g., El Cajon is an NCore site, so any Network Assessment tool recommending removal will not be used. The Del Mar station has a low ranking and is recommended for decommissioning or relocation, based on monitor ranking alone. This task may be undertaken in the next few years. First, more required station relocations and start-ups must be completed. Once those are completed, a review of where to relocate the Del Mar station will be conducted.

Section 4.3.1 Ozone - Correlation Matrix

The correlation matrix analysis shows the correlation, relative difference, and distance between sites. The shape of the ellipses represents the Pearson Squared Correlation between sites with a circle representing zero correlation and a straight line representing perfect correlation; correlation between the sites represents the degree of relatedness. The correlation, however, does not indicate if one site measures concentrations substantially higher or lower than another; for this, the color of the ellipses represents the average relative difference. This analysis aids in determining sites that are redundant. Confounding factors affecting analysis include AQS site data with < 75% completion are not used.

The ozone correlation between sites in San Diego County is shown in Figure 4.5. Two site pairs result in correlations greater than 0.8 and relative differences less than 0.3 for ozone:

1. 06-073-1002 Escondido and 06-073-0003 El Cajon
2. 06-073-1008 Camp Pendleton and 06-073-1001 Del Mar

For ozone, this analysis shows that sites may generate comparable data. This result is expected for ozone, given the regional nature of the pollutant and the density/configuration of the network to have monitors located in population centers. Even if sites measure comparable ozone levels, the need for public reporting of health alerts and Air Quality Index (AQI) levels requires ozone reporting in highly populated communities. This configuration may cause some redundancy but is needed for public welfare. Sites with high correlation, small average differences, and close proximities can be considered redundant; only 06-73-1008 Camp Pendleton and 06-073-1001 Del Mar qualify.

1. The Escondido and El Cajon station are in completely different communities, topography, and register different air mass. Value would be lost by eliminating the ozone monitor at Escondido. The ozone monitor at El Cajon is required, because it is a PAMS and NCore station (regulations require an ozone monitor at PAMS and NCore stations).

2. Both Camp Pendleton and Del Mar are along the Pacific Coast. The ozone monitor at Del Mar often measures the same transport air mass but at different times in the day and sometimes on a different day. If the Del Mar station was decommissioned, the next coastal ozone monitor is at 06-073-1010 Downtown, leaving a 40 mile gap in coverage (see Figure 4.5 for a pictorial representation of this gap). The District may investigate relocating this station in the La Jolla area, so coastal coverage can be maintained.

Table 4.5 (column 1, Correlation) summarizes the ranking for this section.

Figure 4.5 Ozone Correlation Matrix

Legend:

06-073-0003 El Cajon (ECA)
06-073-1001 Del Mar (DMR)
06-073-1002 Escondido (ESC)
06-073-1006 Alpine (ALP)
06-073-1008 Camp Pendleton (CMP)
06-073-1010 Downtown (DTN)
06-073-1011 Blvd (not a San Diego APCD air monitoring site)
06-073-1016 Kearny Villa Road (KVR)
06-073-1201 Pala (not a San Diego APCD air monitoring site)
06-073-2007 Otay Mesa (OTM) now 06-073-1014 Otay Mesa-Donovan (DVN)
06-073-0001 Chula Vista (CVA)

Section 4.3.2 Ozone - Removal Bias

This section discusses the determination of redundant sites. The bias estimation uses the nearest neighbor site to estimate the concentration at that location if the site was not there. A positive bias indicates that if the site being examined was removed, the neighboring site(s) would register higher values. The opposite indicates negative bias. Figure 4.6 is a pictorial representation of the ozone monitors in the network. The darker blue the circle signifies the more negative the bias, the darker red the circle signifies the more positive the bias, and white is neutral.

The Removal Bias between sites in San Diego County for ozone indicates three sites:

1. Escondido
2. El Cajon
3. Del Mar

The results of the Removal Bias test corroborate the results from the Correlation section. As stated earlier, this result is expected for ozone, given the regional nature of the pollutant and the density/configuration of the network to have monitors located in population centers. This configuration may cause some redundancy but is needed for public welfare.

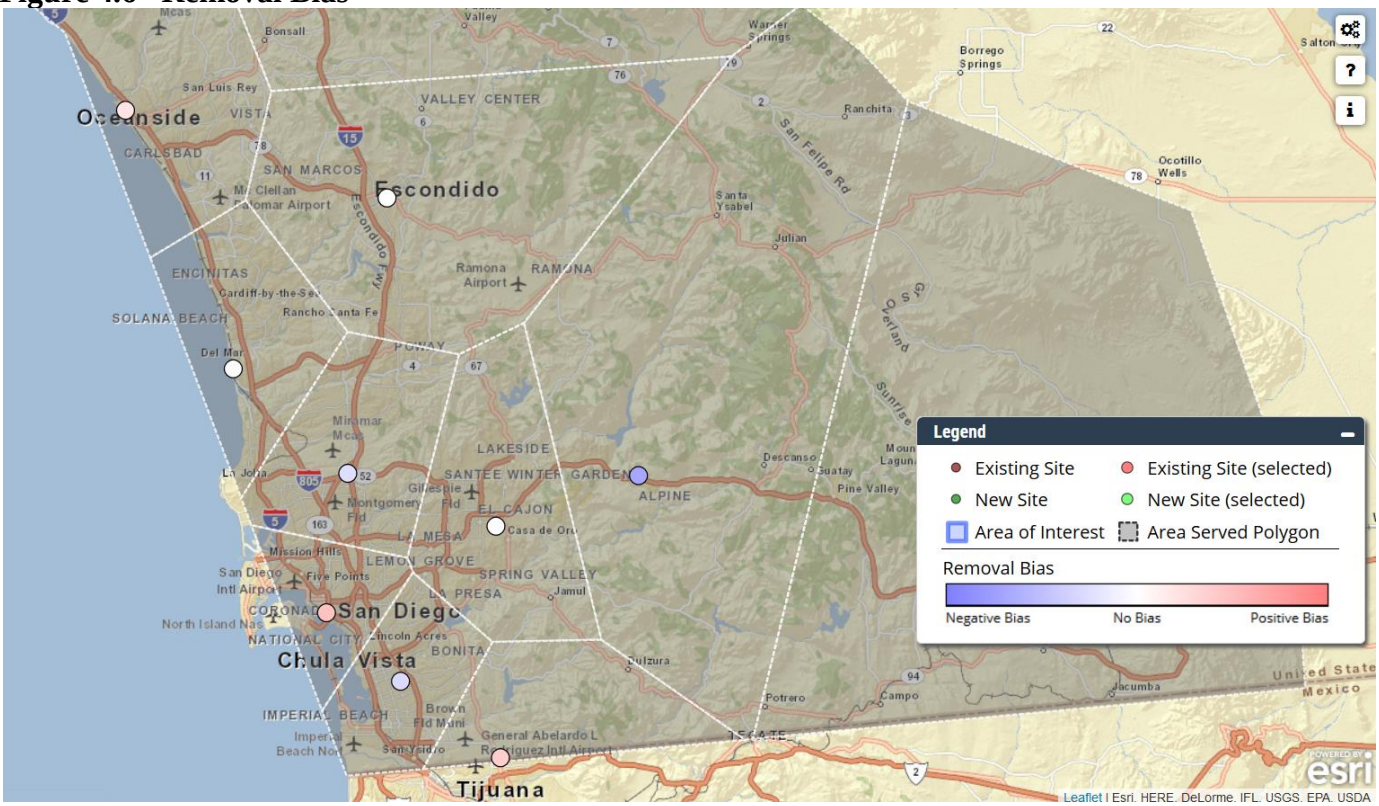
1. Escondido
   The Escondido ozone monitor is used to model the ozone concentrations along Route 78. This area is in the top 10 traffic counts for the County and has significantly different topography than the next closest station. Significant value would be lost if the Escondido ozone monitor was decommissioned.

2. El Cajon
   The ozone monitor at El Cajon is required, because it is a PAMS and NCore station (regulations require an ozone monitor at PAMS and NCore stations).

3. Del Mar
   Both Del Mar and the next closest neighbor, Camp Pendleton, are along the Pacific Coast. The ozone monitor at Del Mar often measures the same transport air mass but at different times in the day and sometimes on a different day. If the Del Mar station was decommissioned, the next coastal ozone monitor is the Downtown station, creating a 40 mile gap in coverage (see Figure 4.4 for a pictorial representation of this gap).

Table 4.5 (column 2, Removal) summarizes the ranking for this section.

Figure 4.6 Removal Bias



Legend:

06-073-0003 El Cajon (ECA)
06-073-1001 Del Mar (DMR)
06-073-1002 Escondido (ESC)
06-073-1006 Alpine (ALP)
06-073-1008 Camp Pendleton (CMP)
06-073-1010 Downtown (DTN)
06-073-1011 Blvd (not a San Diego APCD air monitoring site)
06-073-1016 Kearny Villa Road (KVR)
06-073-1201 Pala (not a San Diego APCD air monitoring site)
06-073-2007 Otay Mesa (OTM) now 06-073-1014 Otay Mesa-Donovan (DVN)
06-073-0001 Chula Vista (CVA)

Section 4.3.3 Ozone - Area Served

The regions and area served by the monitors represent significant population conglomerations. Figure 4.7 is a pictorial representation of the area served by the ozone monitors in the air quality network. The elimination of any station will correspond to a decrease in coverage and a decrease in the District's ability to warn and inform the public of any health concerns.

The area east of Camp Pendleton and west of Escondido includes the communities of San Marcos and Vista. This area is one of the faster growing areas in the county. Ozone, nitrogen dioxide, and $PM_{2.5}$ concentrations have been shown to be derived from the measured concentrations from the Camp Pendleton and Escondido station ozone, nitrogen dioxide, and $PM_{2.5}$ monitors.

The area north of Escondido includes the communities of Bonsall and Fallbrook. This area has expanded, and its population has grown significantly over the years. The SCAQMD has monitors for ozone, nitrogen dioxide, PM_{10} and $PM_{2.5}$ in the Temecula Valley (the area north of Fallbrook), Elsinore, Norco/Corona, and Perris Valley. The ozone, nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations for the general areas of Bonsall and Fallbrook can be derived from the Escondido and Temecula ozone, nitrogen dioxide, PM_{10} and $PM_{2.5}$ monitors.

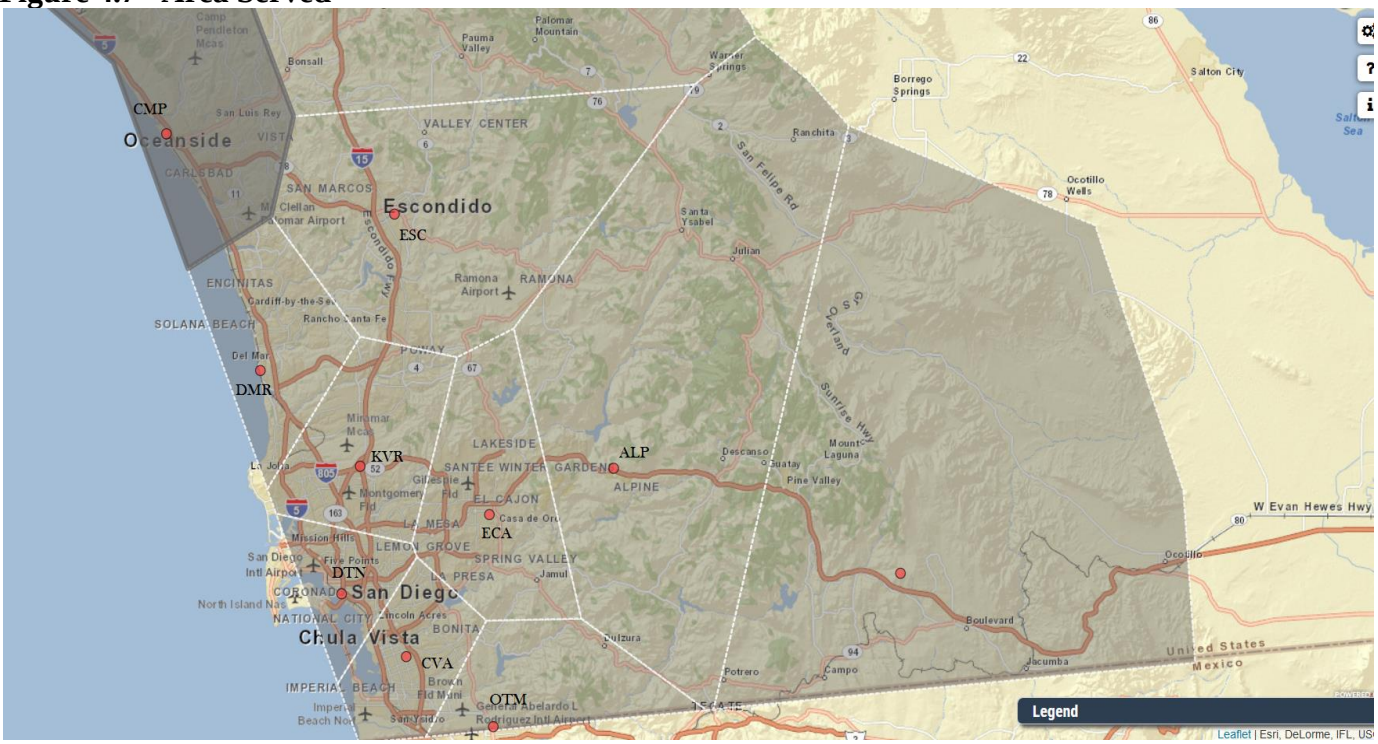
The areas east of the Alpine station have low population centers, low traffic count, and similar topography, so an additional ozone monitor in this area would add little informational value. Additionally, District studies have shown the measured concentrations to be the same (just time delayed) as Alpine.

The areas east of the Escondido station have low population centers, low traffic count, and similar topography, so an additional ozone monitor in this area would add little informational value. Additionally, District studies have shown the measured concentrations to be the same as at Escondido.

The area north of the Otay Mesa–Donovan station is one of the faster growing areas in the county. Some temporary monitoring may be undertaken between Otay Mesa and El Cajon, if modeling triggers a need to establish a presence.

Table 4.5 (column 3, Area Served) summarizes the ranking for this section.

Figure 4.7 Area Served



06-073-0003 El Cajon (ECA)
06-073-1001 Del Mar (DMR)
06-073-1002 Escondido (ESC)
06-073-1006 Alpine (ALP)
06-073-1008 Camp Pendleton (CMP)
06-073-1010 Downtown (DTN)
06-073-1011 Blvd (not a San Diego APCD air monitoring site)
06-073-1016 Kearny Villa Road (KVR)
06-073-1201 Pala (not a San Diego APCD air monitoring site)
06-073-2007 Otay Mesa (OTM) now 06-073-1014 Otay Mesa-Donovan (DVN)
06-073-0001 Chula Vista (CVA)

Section 4.3.4 Ozone - Surface Probability

Surface probability maps provide information on the spatial distribution of the highest value for a pollutant. It is the probability that exceedances may occur in certain geographical locations; not the probability that a monitor will exceed. These maps should not be used alone to justify a new monitor/air monitoring station location. Other materials should be used as well, for example demographics, area served, budgetary constraints, logistics, and other such concerns.

Figures 4.8-4.10 are pictorial representations of the areas of possible exceedances (red being the highest probability and green being the lowest), with the ambient air monitoring stations indicated by circles. The level of probability increases, depending on what maximum threshold is used. The possible thresholds are the current federal NAAQS of 75 ppb, the current State CAAQS of 70 ppb, and 65 ppb. The District has adequate coverage using all three thresholds.

If the threshold is set to 65 ppb, all District monitors will have a 35%-75% probability of exceedances.
If the threshold is set to 70 ppb, all District monitors will have a 10%-65% probability of exceedances.
If the threshold is set to 75 ppb, all District monitors will have a 5%-60% probability of exceedances.

Table 4.5 (columns 4a, 4b & 4c for 65, 70, & 75 ppb, respectively) summarizes the ranking for this section.

Figure 4.8a 65 ppb Threshold

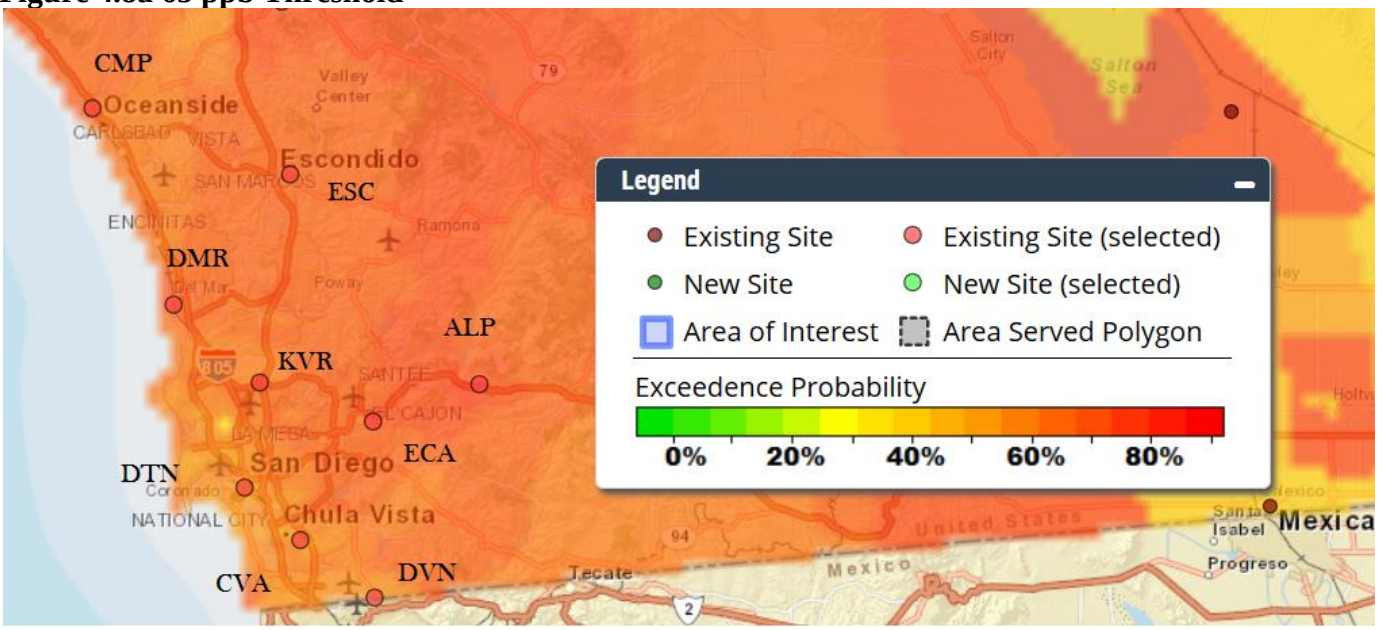


Figure 4.8b 65 ppb Threshold with Area Served Overlay

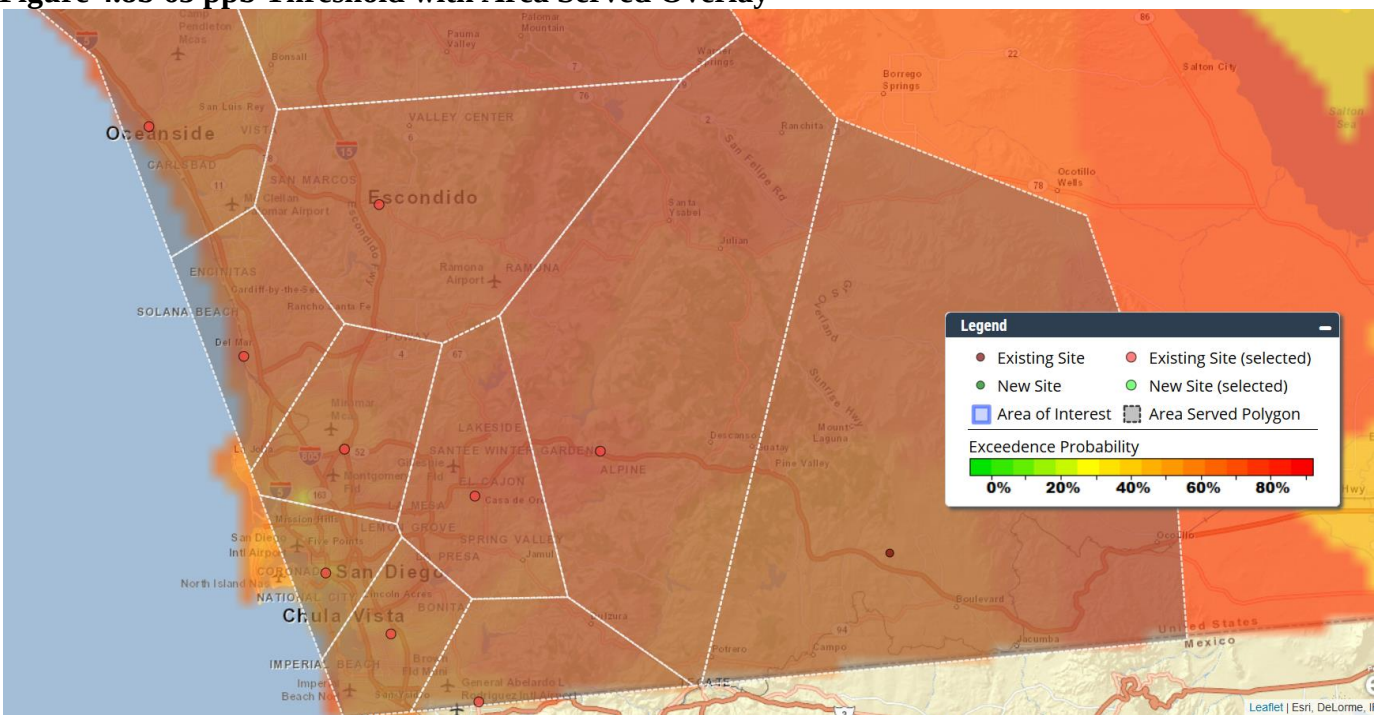


Figure 4.9a 70 ppb Threshold

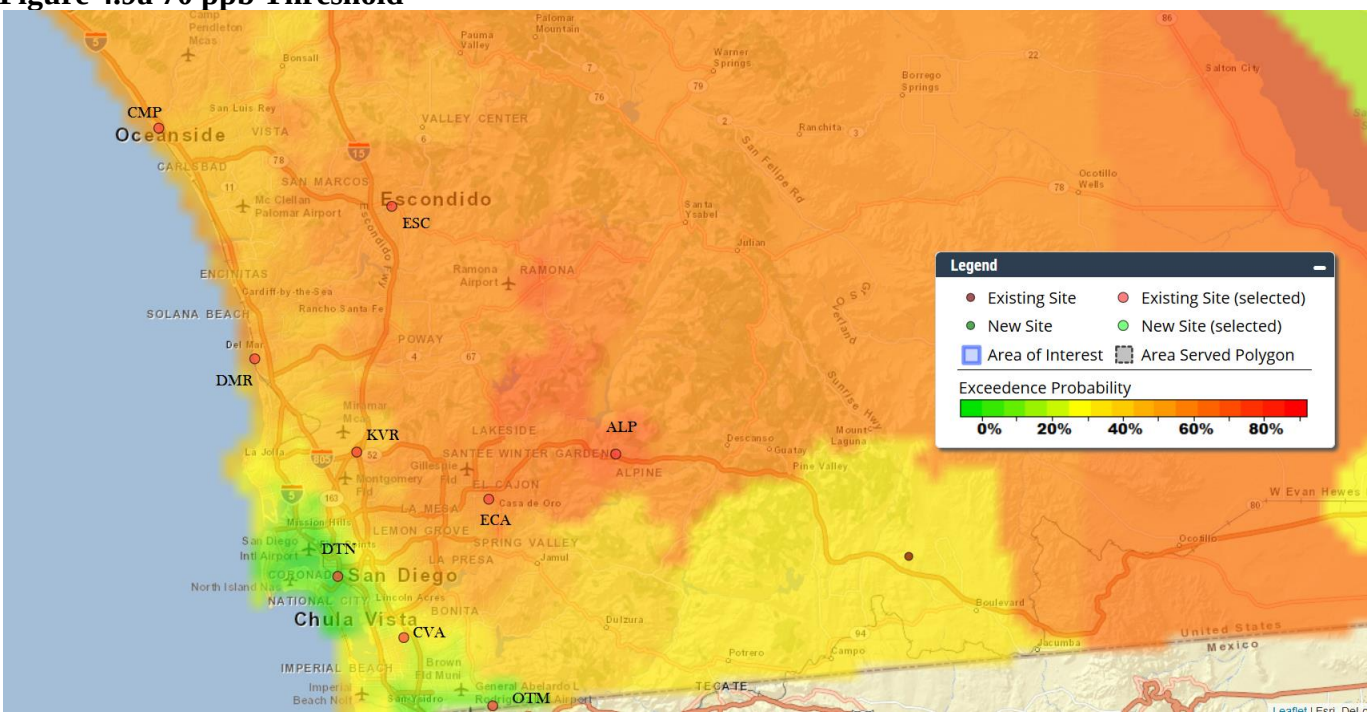


Figure 4.9b 70 ppb Threshold with Area Served Overlay

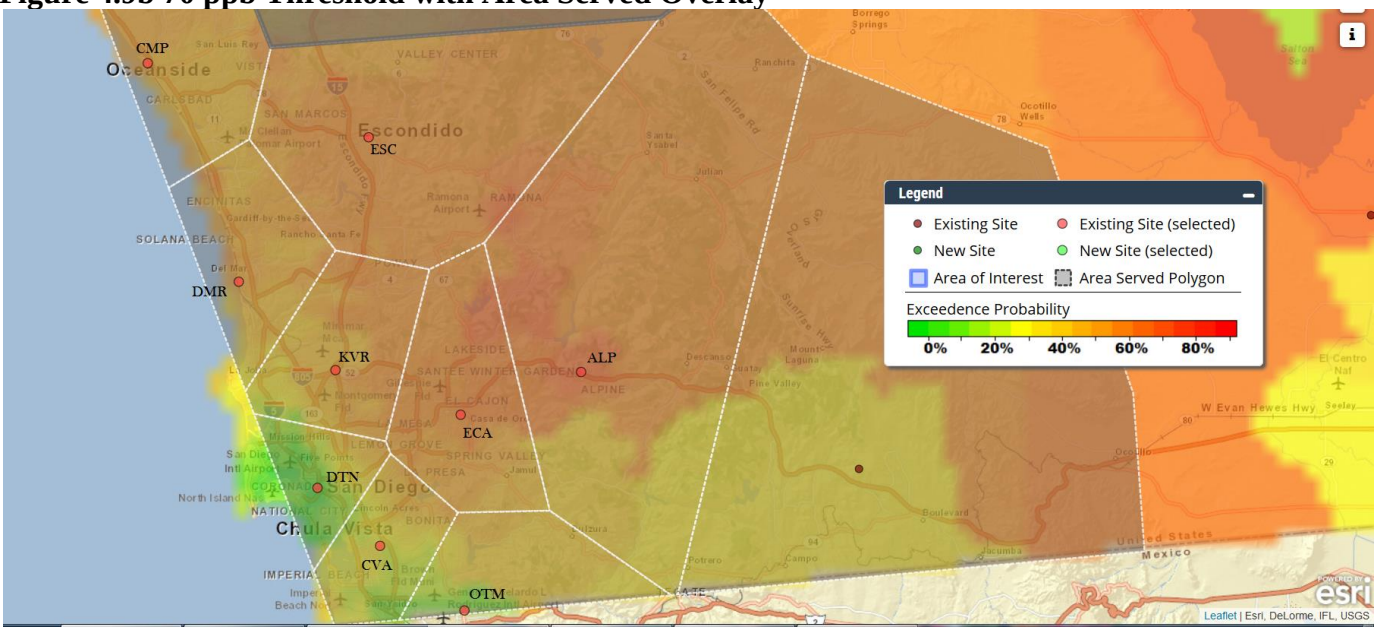


Figure 4.10a 75 ppb Threshold

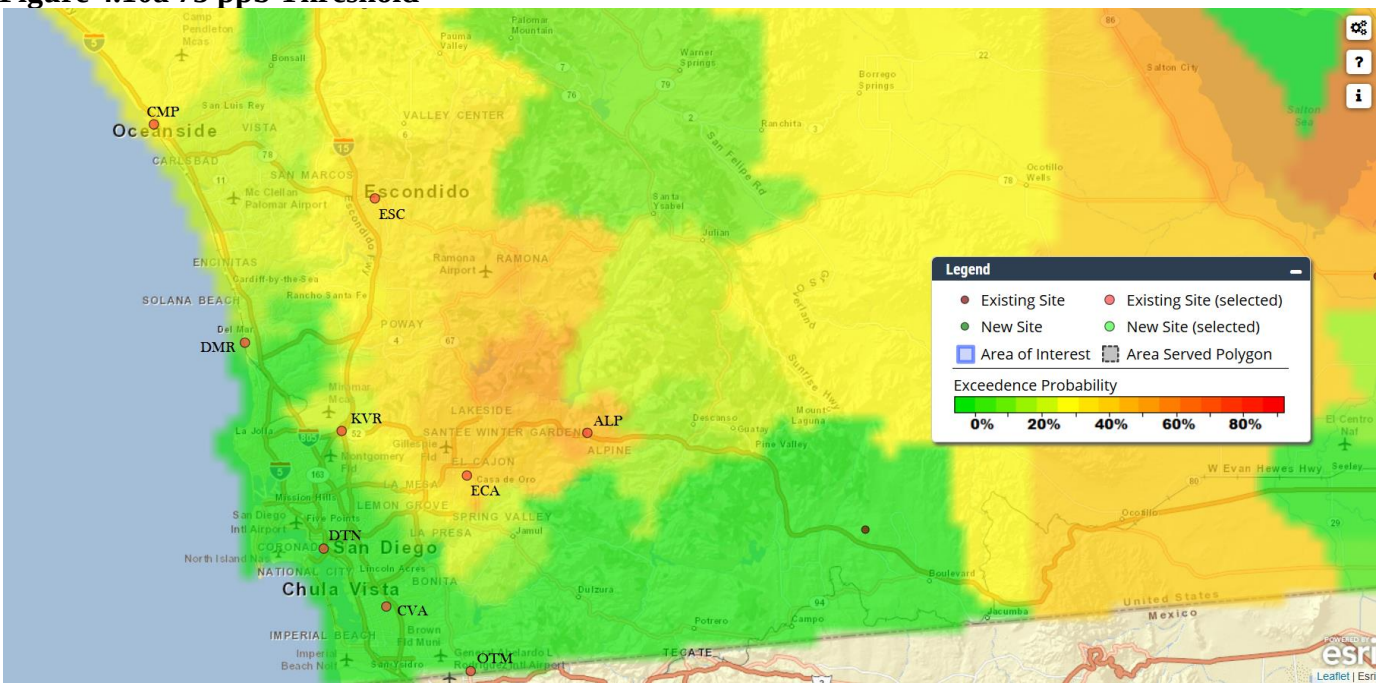
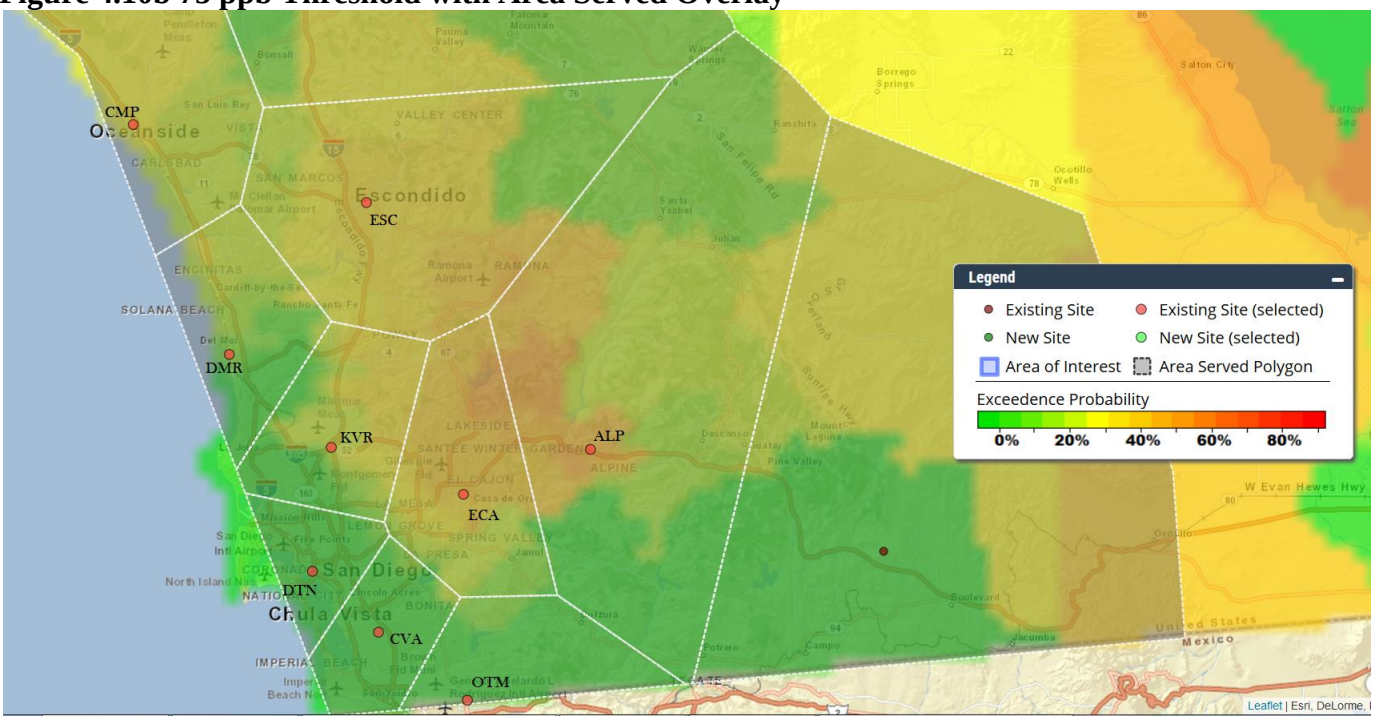


Figure 4.10b 75 ppb Threshold with Area Served Overlay



Section 4.3.5 Ozone - Internal District Criteria

Table 4.5 is a summary of the District's Internal Criteria used to justify the network monitors.

Table 4.5 Ozone Internal District Criteria

	Overall Scoring	COMMENTS	**1.** Total Monitors	**2.** Community Type	**3.** QA/QC Needs	**4.** Other
Alpine (ALP)	**20**	**1:** n/a **2:** Rural/bedroom **3:** Possibly PAMS **4:** PAMS and PM2.5 trends; recently moved	4	4	2	10
Camp Pendleton (CMP)	**29**	**1:** n/a **2:** Bedroom **3:** For PAMS **4:** PAMS and PM2.5 trends	5	6	10	8
Chula Vista (CVA)	**34**	**1:** n/a **2:** Mixed use **3:** PM10 and soon PM2.5 **4:** Toxics and PM2.5 trends; deck upgrade	7	7	10	10
Del Mar (DMR)	**7**	**1:** n/a **2:** Bedroom **3:** No need **4:** O3 trends	1	4	0	2
Otay Mesa-Donovan (DVN)	**27**	**1:** n/a **2:** Industrial becoming mixed use **3:** Possibly PM10 **4:** Toxics and PAMS trends; recently moved	6	7	4	10
El Cajon (ECA)	**44**	**1:** n/a **2:** Light industrial/mixed use **3:** With ARB **4:** PM2.5 and PAMS trends; recently moved	17	7	10	10
Escondido (ESC)	**30**	**1:** n/a **2:** Light industrial/mixed use **3:** Compare to Near-road **4:** PM2.5 and Toxics trends	9	9	8	8
San Diego-Beardsley (DTN)	**40**	**1:** n/a **2:** Heavy industrial/mixed use **3:** Compare to Near-road **4:** PM2.5, Toxics, and Carbon trends	10	10	10	10
San Diego-Kearny Villa Rd. (KVR)	**27**	**1:** n/a **2:** Mixed use **3:** PM2.5 **4:** PM2.5 and PAMS trends; recently moved	4	5	8	10

The overall ranking is also in Table 4.5 (column 5).

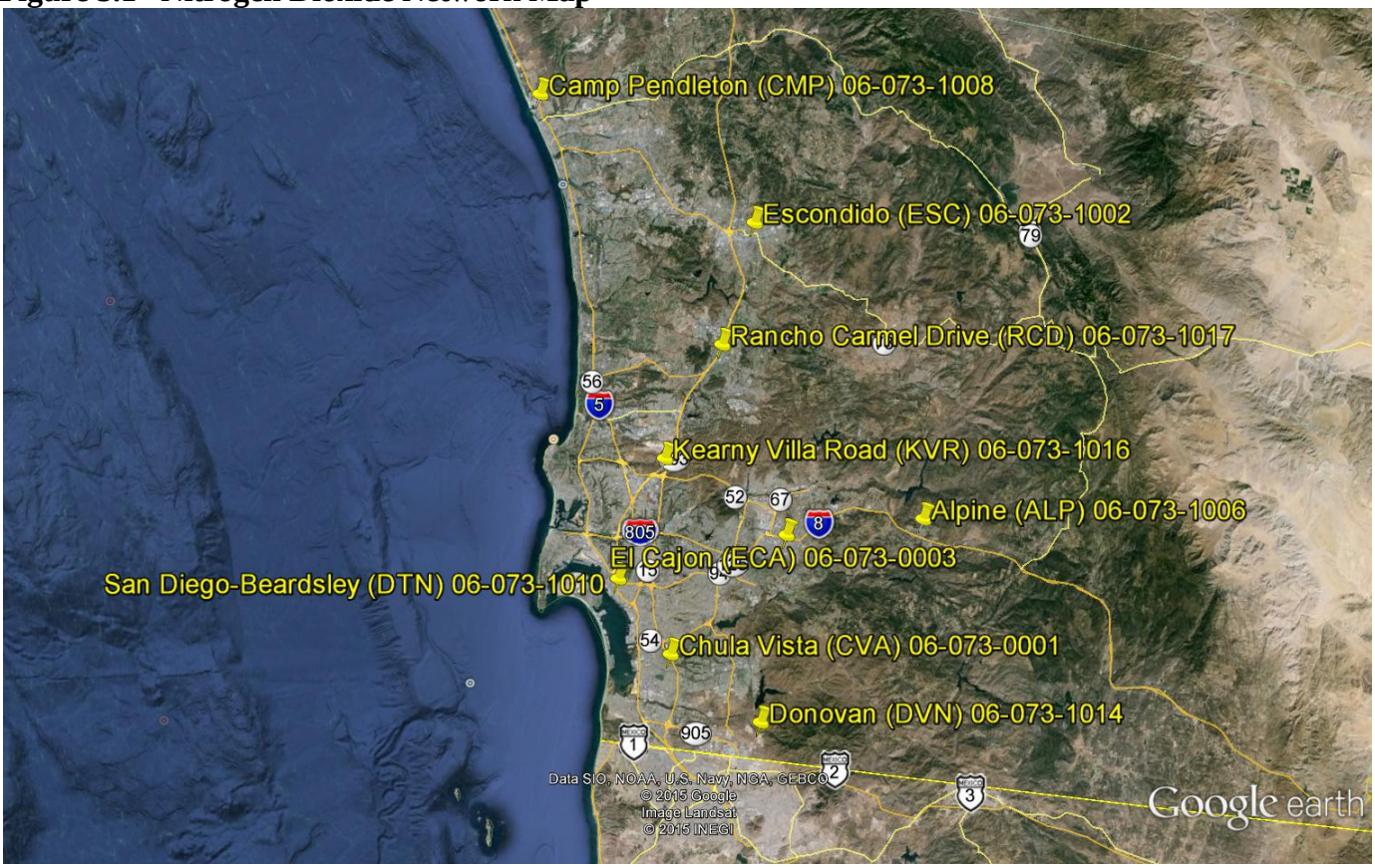
Chapter 5 Nitrogen Dioxide (NO_2) and NOy

Section 5.0.0 Nitrogen Dioxide - Introduction

Ambient level nitrogen dioxide was sampled on a continuous basis at locations throughout the SDAB (Figure 5.1). Reactive oxides of nitrogen (NOy) are sampled at the El Cajon location for the National Core (NCore) and Photochemical Assessment Monitoring Stations (PAMS) programs. There is no state or national standard for this pollutant.

- The Otay Mesa (OTM) station was permanently relocated to the Donovan State Prison area, this station is called Donovan (DVN).
- The El Cajon station was temporarily relocated to the Gillespie Field area off of Floyd Smith Dr.
- The Rancho Carmel Dr. (RCD) Near-road station was not operational until 2015, so no data from that station is in this report.
- The Kearny Mesa-Overland (KMA) station relocated to Kearny Villa Rd (KVR).

Figure 5.1 Nitrogen Dioxide Network Map



The reported concentrations reflect a mix of the two station moves listed above. Because the Donovan relocation is permanent, the maps and table parameters reflect the new site metadata (labeled as DVN). Because the Floyd Smith Dr. relocation is temporary, the maps and table parameters reflect the permanent site metadata (labeled as ECA).

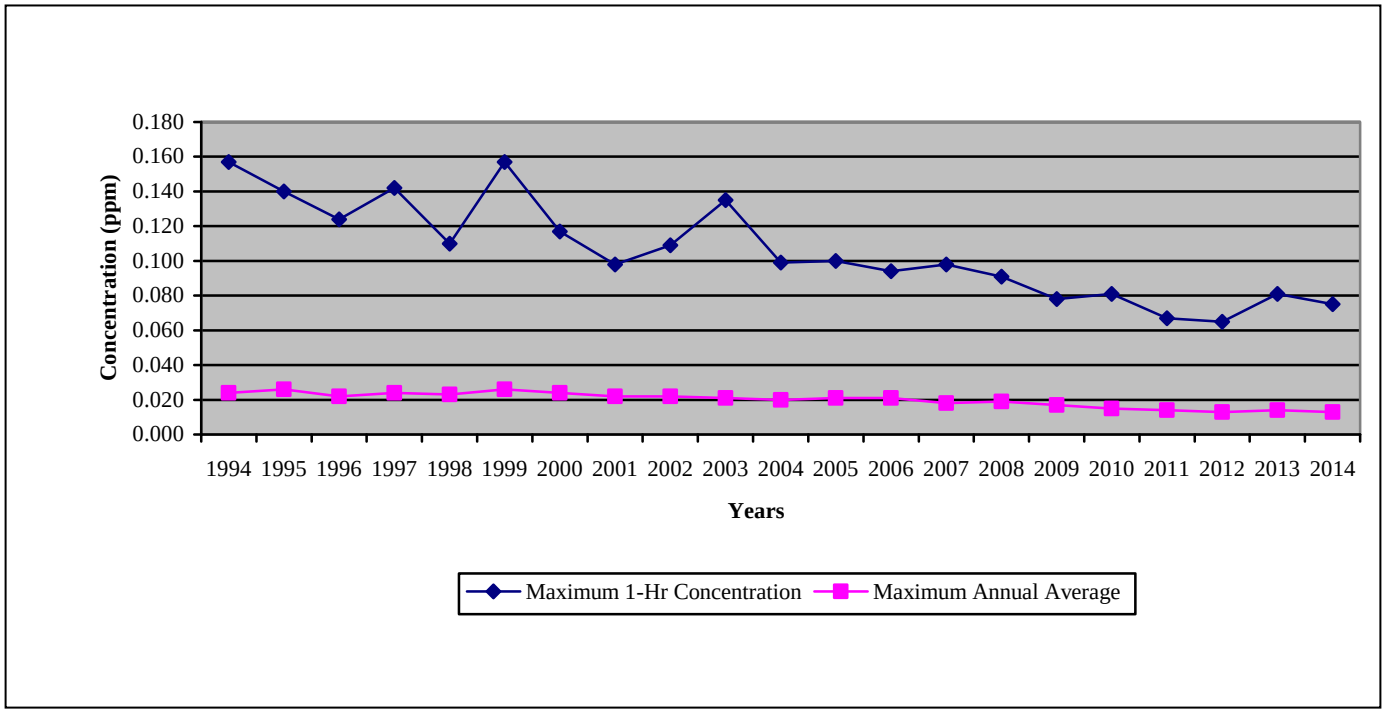
Section 5.1.0 Nitrogen Dioxide - Trends in the SDAB

As seen in Figure 5.2, emissions of NO_2 have decreased steadily over the years in the SDAB (Table 5.1). As with the State and the nation, the general downward trend is a result of improved emission control technology on mobile sources, and NO_2 emissions should continue to decrease. Note that the "Days above the National 1-Hr Standard" row reflects the nitrogen dioxide standard for that year. Please Note: The concentrations from Otay Mesa (border crossing) have been omitted from this table.

Table 5.1 Summary of Nitrogen Dioxide Concentrations, 1994-2014

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Maximum 1-Hr Concentration (ppm)	0.157	0.140	0.124	0.142	0.110	0.157	0.117	0.098	0.109	0.135	0.099	0.100	0.094	0.098	0.091	0.078	0.081	0.067	0.065	0.081	0.075
Maximum Annual Average (ppm)	0.024	0.026	0.022	0.024	0.023	0.026	0.024	0.022	0.022	0.021	0.020	0.021	0.021	0.018	0.019	0.017	0.015	0.014	0.013	0.014	0.013
Days above the National 1-Hr Standard (#)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 5.2 Nitrogen Dioxide Concentrations, 1994-2014



Section 5.1.1 Nitrogen Dioxide Measurements by Site

Table 5.2a lists the maximum nitrogen dioxide measurements and NOy-NO for each nitrogen dioxide monitoring location and NCore, respectively; Figure 5.3 shows the values graphically with respect to the Annual Avg Std for 2015 (0.053 ppm).

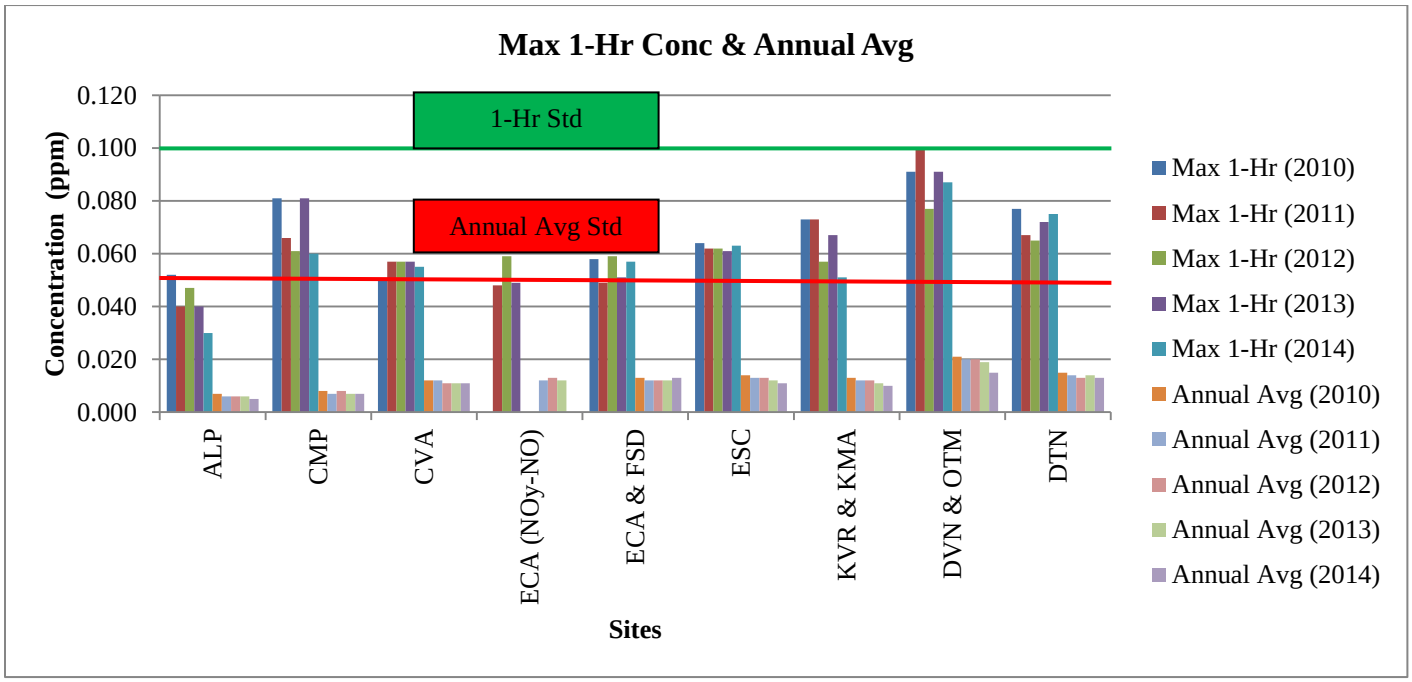
Table 5.2a Nitrogen Dioxide by Site, 2010-2014

Site (name)		Maximum Concentration for 1-Hr (ppm)					Annual Average (ppm)				
		2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
Alpine	ALP	0.052	0.040	0.047	0.040	0.030	0.007	0.006	0.006	0.006	0.005
Camp Pendleton	CMP	0.081	0.066	0.061	0.081	0.060	0.008	0.007	0.008	0.007	0.007
Chula Vista	CVA	0.050	0.057	0.057	0.057	0.055	0.012	0.012	0.011	0.011	0.011
*El Cajon	ECA (NOy-NO)	**	0.048	0.059	0.049	**	**	0.012	0.013	0.012	**
El Cajon	ECA & FSD	0.058	0.049	0.059	0.051	0.057	0.013	0.012	0.012	0.012	0.013
Escondido	ESC	0.064	0.062	0.062	0.061	0.063	0.014	0.013	0.013	0.012	0.011
Kearny Villa Road	KVR & KMA	0.073	0.073	0.057	0.067	0.051	0.013	0.012	0.012	0.011	0.010
Otay Mesa	DVN & OTM	0.091	0.100	0.077	0.091	0.087	0.021	0.020	0.020	0.019	0.015
San Diego-Beardsley	DTN	0.077	0.067	0.065	0.072	0.075	0.015	0.014	0.013	0.014	0.013

*The NOy monitor does not have FRM designation, so it cannot be compared to the NAAQS.

** Not operational

Figure 5.3 Graph of Max 1-Hr Concentration and Annual Average



Section 5.1.2 Nitrogen Dioxide Measurements by Site, Design Value 2010-2014

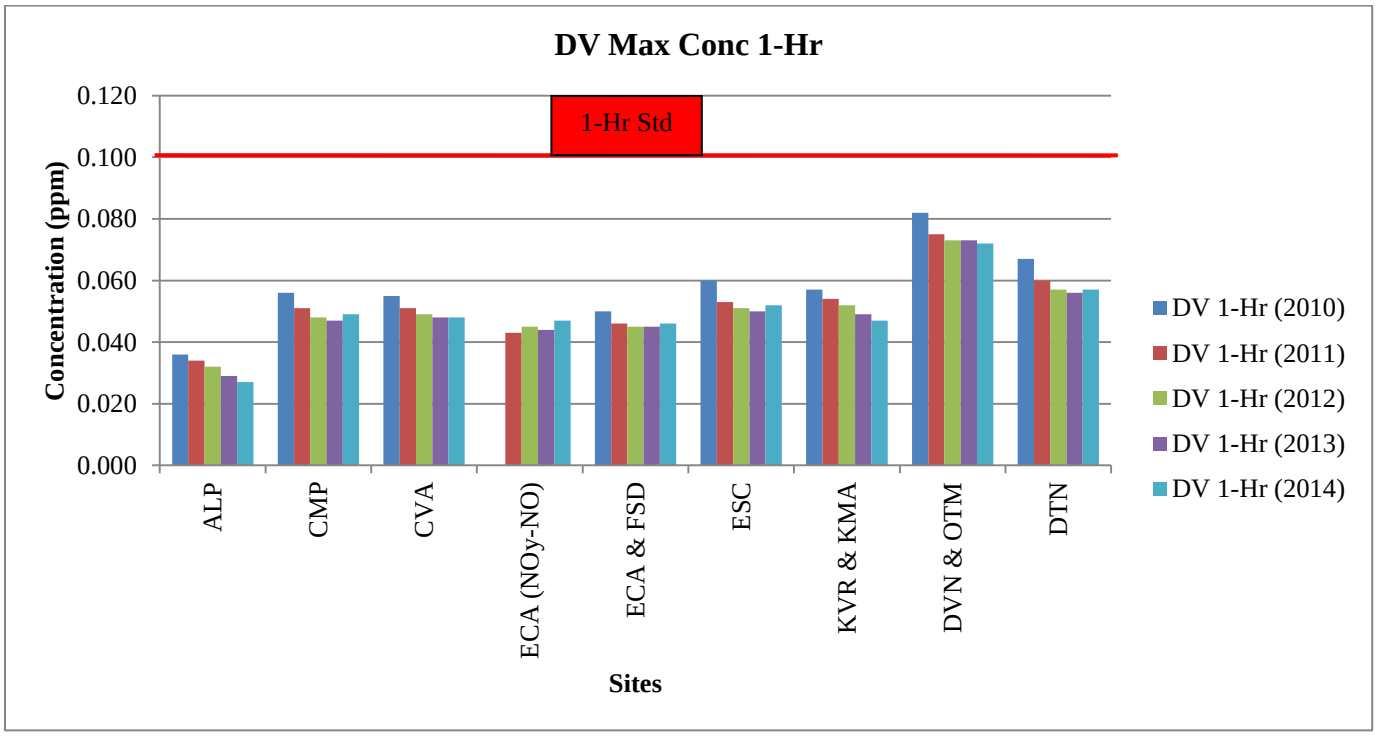
Table 5.2b lists the maximum nitrogen dioxide measurements and NOy-NO for each nitrogen dioxide monitoring location and NCore, respectively; Figure 5.4 shows the Design Values (98 percentile Daily maximum) graphically with respect to the 1-Hr Std of 2015 (0.100 ppm).

Table 5.2b Nitrogen Dioxide Design Value Measurements by Site

Site (name)		Design Value Maximum Concentration for 1-Hr (ppm)				
		2008-2010	2009-2011	2010-2012	2011-2013	2012-2014
Alpine	ALP	0.036	0.034	0.032	0.029	0.027
Camp Pendleton	CMP	0.056	0.051	0.048	0.047	0.049
Chula Vista	CVA	0.055	0.051	0.049	0.048	0.048
*El Cajon	ECA (NOy-NO)	**	0.043	0.045	0.044	0.047
El Cajon	ECA & FSD	0.050	0.046	0.045	0.045	0.046
Escondido	ESC	0.060	0.053	0.051	0.050	0.052
Kearny Villa Road	KVR & KMA	0.057	0.054	0.052	0.049	0.047
Otay Mesa	DVN & OTM	0.082	0.075	0.073	0.073	0.072
San Diego-Beardsley	DTN	0.067	0.060	0.057	0.056	0.057

*The NOy monitor does not have FRM designation, so it cannot be compared to the NAAQS.
** Not operational

Figure 5.4 Graph of Design Value (DV) Max 1-Hr Concentration and Annual Average



Section 5.2.0 Nitrogen Dioxide Federal Design Criteria Requirements

Federal requirements for the number of nitrogen dioxide monitors are discussed in the 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.3 "Nitrogen Dioxide (NO_2) Design Criteria".

The NCore/NOy requirements for the number of reactive oxides of nitrogen (NOy) monitors for the NCore pollutants are also in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 3, "Design Criteria for NCore Sites", subsection (b). Note that only the passages applicable to the SDAB have been cited.

The Federal requirements for the number of NOy monitors for the PAMS program are in the 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 5 "Network Design for Photochemical Assessment Monitoring Stations (PAMS)", subsection 5.3. Note that only the passages applicable to the SDAB have been cited.

Section 5.2.1 Nitrogen Dioxide - Near-road Number of NO_2 Monitors

The requirements necessary to fulfill the NO_2 Near-road criteria are described in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.3, "Nitrogen Dioxide (NO_2) Design Criteria", subsections 4.3.2 and 4.3.2(a)(1). Table 5.3a lists the minimum number of Near-road monitors required for the SDAB.

Table 5.3a Minimum Number of Near-Road Monitors Required

MSA (name)	County (name)	Population from 2010 Census (#)	Minimum Number of Monitors Required (#)	Are Additional Monitors Required (yes/no)	Minimum Number of Additional Monitors Required (#)	Total Number of Monitors Required (#)	Total Number of Active Monitors (#)	Total Number of Monitors Needed (#)
San Diego	San Diego	3.2 million	1	Yes	1	2	1	1 (see section 5.2.1.2)

Section 5.2.1.1 Nitrogen Dioxide - Near-road NO_2 Monitor Location (first site)

The first NO_2 Near-road location is off of Rancho Carmel Dr. (RCD), approximately 3.7 miles north of Poway Rd. NOx and meteorological parameters are measured there. This site has received EPA approval.

Section 5.2.1.2 Nitrogen Dioxide - Near-road NO_2 Monitor Location (second site)

The criteria for the second Near-road location are more flexible than the criteria for the first site. The second site is not necessarily the next location according to the Fleet Equivalency (FE) ranking. The EPA prescribes that the second site be selected so that it is differentiated from the first by one or more factors affecting traffic emissions and/or pollution transport, i.e., fleet mix, terrain, or geographic area, or by a different route, interstate, or freeway designation.

The EPA's primary recommendation for a second site is to attempt to have the second site with as many of the aforementioned characteristics different from the first site, without sacrificing the objective of measuring relative peak NO_2 concentrations. The District's attempts to establish a second Near-road NO_2 monitor site at two different locations were unsuccessful (see 2013 Annual Network Plan).

The proposed location for the second Near-road site is in Logan Heights off of Newton Ave. (see Table 5.6b for the Near-road matrix for Newton Ave.). While the traffic count is lower for this site than other possible non-Barrio areas, this location is in an Environmental Justice area, 1.1 miles downwind of an ambient air monitoring station (DTN), which has a Regional NOx monitor. The measured concentrations from the DTN station can be subtracted from this location to get a clearer pollution profile from the contribution from the road segment. In addition, the second site would be across from the shipyards, which operate diesel engines, so these emissions can also be measured. This site has received preliminary approval from the EPA.

Section 5.2.2 Nitrogen Dioxide - Area-wide NO_2 Monitors

40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.3, "Nitrogen Dioxide (NO_2) Design Criteria", subsection 4.3.3 lists the requirements needed to fulfill the Area-wide NO_2 monitoring criteria. The Area-wide monitor cannot also be the Regional Administrator monitor. Table 5.3b lists these requirements.

Table 5.3b NO_2 Area-Wide Monitor, 2014

MSA (name)	County (name)	Population from 2010 Census (#)	Maximum Expected Concentration Site (name)	Maximum Expected Concentration Site AQS ID (#)	Meet NAAQS? (yes/no)
San Diego	San Diego	3.2 million	Escondido (ESC)	06-073-1002	Yes

Section 5.2.3 Nitrogen Dioxide - Regional Administrator Required NO_2 Monitors

40 CFR Part 58-"Ambient Air Quality Surveillance", Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.3, "Nitrogen Dioxide (NO_2) Design Criteria", subsection 4.3.4 lists the requirements needed to fulfill the Regional Administrator NO_2 monitoring (RA-40) criteria. The Area-wide monitor cannot also be the Regional Administrator monitor. Table 5.3c lists these requirements.

Table 5.3c Regional Administrator Designated NO_2 Monitor, 2014

MSA (name)	County (name)	Population from 2010 Census (#)	Maximum Expected Concentration Site (name)	Maximum Expected Concentration Site AQS ID (#)	Meet NAAQS? (yes/no)
San Diego	San Diego	3.2 million	San Diego-Beardsley (DTN)	06-073-1010	Yes

Section 5.2.4 NOy-NCore Monitoring

40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.3, "Nitrogen Dioxide (NO_2) Design Criteria", subsection 4.3.6 lists the requirements needed to fulfill the trace level (NCore) NO_y monitoring criteria. These requirements are reiterated in the 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 3, "Design Criteria for NCore Sites", subsection (b). Table 5.3d lists these requirements. Please see the NCore section for additional details.

Table 5.3d Design Criteria for the Minimum Number of NCore NOy Monitors Required

MSA	County	Minimum Number of NCore NOy Monitors Required (#)	Number of Active NCore NOy Monitors (#)	Number of NCore NOy Monitors Needed (#)
San Diego	San Diego	1	1	None

Section 5.2.5 NOy-PAMS Monitoring

The 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 5 "Network Design for Photochemical Assessment Monitoring Stations (PAMS)", subsection 5.3 lists the requirements needed to fulfill the NOy-PAMS monitoring criteria. Table 5.3e lists these requirements.

Table 5.3e Design Criteria for the Minimum Number of PAMS NOy Monitors Required

Minimum Number of NOy Monitors Required Either at a Type I or Type III Site (#)	Number of Active Type I or Type III Site (#)	Number of Active NOy Monitors at a Type I or Type III Site (#)	Number of NOy Monitors Needed (#)	NOy Monitor Location (name)	NOy Monitor Location AQS ID (#)
1	2	1*	None	El Cajon* (ECA)	06-073-0003

* In 2011, the District was granted a waiver by the EPA Region IX Authority to designate the El Cajon location, instead of the Alpine location, as satisfying this requirement.

Section 5.3.0 NO/NO_2/NOx & NOy Monitor and Station Evaluation

Table 5.4 is a summary of the multilayered approach for the NO/NO_2/NOx monitors. No NOx monitor is recommended for decommissioning.

Table 5.4 NO/NO_2/NOx Monitor Summary Rating

	Overall Scoring	**COMMENTS**	**1.**Total Monitors	**2.** Community Type	**3.**QA/QC Needs	**4.**Other
Alpine (ALP)	**28**	**1:** n/a **2:** Rural/bedroom **3:** Possibly PAMS **4:** PAMS trends; recently moved	4	4	10	10
Camp Pendleton (CMP)	**27**	**1:** n/a **2:** Bedroom **3:** For PAMS **4:** PAMS trends	5	6	8	8
Chula Vista (CVA)	**30**	**1:** n/a **2:** Mixed use **3:** PM10 and soon PM2.5 **4:** Toxics; deck upgrade	7	7	6	10
Otay Mesa-Donovan (DVN)	**29**	**1:** n/a **2:** Industrial becoming mixed use **3:** Possibly PM10 **4:** Toxics and PAMS trends; recently moved	6	7	6	10
El Cajon (ECA)	**43**	**1:** n/a **2:** Light Industrial/mixed use **3:** With ARB **4:** NOy and PAMS trends; recently moved	17	7	10	10
Escondido (ESC)	**36**	**1:** n/a **2:** Light Industrial/mixed use **3:** Compare to Near-road at RCD **4:** PM2.5 and Toxics trends; designated an Area-wide monitor	9	9	6	10
Rancho Carmel Dr. (RCD)	**27**	**1:** n/a **2:** Bedroom **3:** Near-road **4:** Compare to ESC	2	9	6	10
San Diego-Beardsley (DTN)	**38**	**1:** n/a **2:** Heavy Industrial/mixed use **3:** Compare to Near-road **4:** PM2.5, Toxics, and Carbon trends; EJ site; designated a Regional monitor	10	10	8	10
Kearny Villa Rd. (KVR)	**27**	**1:** n/a **2:** Mixed use **3:** PM2.5 **4:** PAMS trends; recently moved	4	5	8	10
2ND Near-road (Barrio)	**29**	**1:** n/a **2:** Heavy Industrial/mixed use **3:** Near-road **4:** Compare to ESC	3	10	6	10

Section 5.3.1 NO/NO_2/NOx Monitor and Station Evaluation

It is the practice of the District to use NO/NO_2/NOx instrumentation for ozone instrumentation quality control as another tool for data validation. NOx and O_3 have an inverse relationship. With high O_3 concentrations, the NOx concentrations will be proportionally lower. For example, if the data analyst sees what appears to be anomalous O_3 data, but the NOx monitors confirms a proportional inverse response, than the O_3 data is more than likely valid. In effect, the NOx monitors serve as an automated level I data review.

NOx monitors at the Near-road location(s) and those that have a designated purpose will be graded the highest; NOx monitors collocated at high O_3 locations and PAMS sites will be graded slightly lower than the previously mentioned NOx monitors. The remaining NOx monitors will be graded by the area served.

Section 5.3.2 NOy Monitor and Station Evaluation

There are no EPA Network Assessment tools for NOy. Because NOy monitoring is only required at the El Cajon station as part of the NCore and PAMS programs, no summary, such as the one provided by Table 5.7, is needed.

Since implementation, all measurements from the NOy instrument measure exactly the same concentrations as those from the collocated NOx instrument. The NOy values follow the same seasonal, diurnal, and special event patterns as the collocated NOx instrument. The yearly, monthly, weekly, daily, and hourly averages are identical for the NOy and NOx instrumentation (see the 2014 Annual Network Plan for supporting documentation). As of yet, the data from the NOy monitor offer no added benefit to the San Diego air quality monitoring network. Additionally, all facets of the NOy instrument are exceeding expensive for both parts and labor. Furthermore, the NOy monitor generates less usable valid data than the NOx monitor due to the additional QA/QC functions required for the NCore program, as well as the higher frequency of repairs and/or infrastructure replacement. The NOy instrument is a significant labor drain and the saved man-hours from the decommissioning of this non-criteria pollutant instrument would alleviate the manpower strain on several programs, especially the criteria pollutant programs. The District does not have the authority to decommission the NOy instrument, but we strongly recommend that the EPA grant the District a waiver from NOy monitoring and permission to decommission this instrument to save considerable funds in a dwindling budget. The savings can be spent on programs/monitors that offer added benefits to the District's air quality monitoring network.

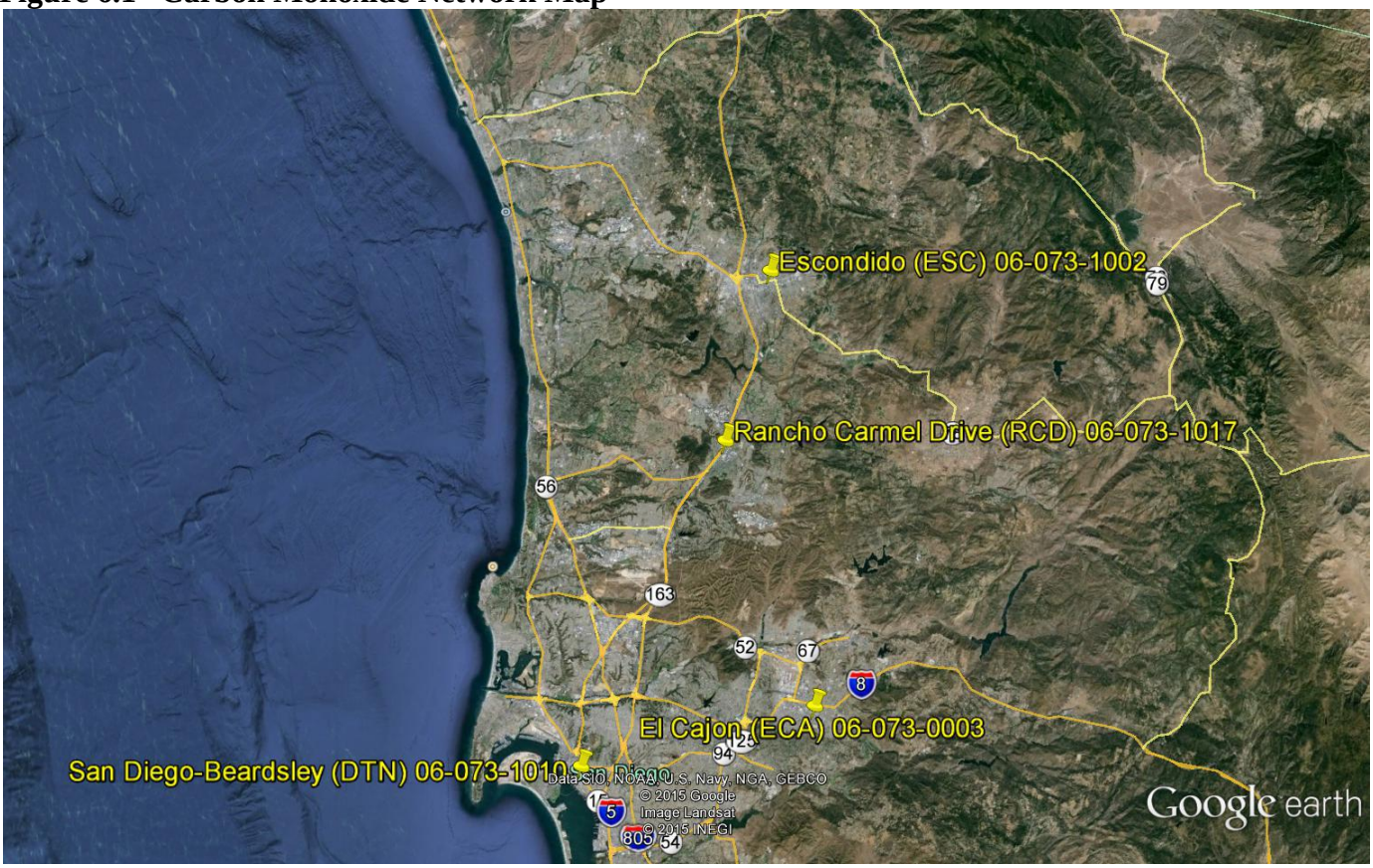
Chapter 6 Carbon Monoxide (CO)

Chapter 6.0.0 Carbon Monoxide – Introduction

Carbon monoxide (CO) is sampled on a continuous basis at four locations in the SDAB (Figure 6.1). Trace level CO was sampled at the El Cajon-NCore site.

- The El Cajon station was temporarily relocated to the Gillespie Field area off of Floyd Smith Drive.

Figure 6.1 Carbon Monoxide Network Map



The reported concentrations reflect a mix of the station move listed above. Because the Floyd Smith Drive relocation is temporary, the maps and table parameters reflect the permanent site metadata (labeled as ECA).

The CO monitor at Rancho Carmel Drive did not become operational until 2015, therefore there is no historical data to compare; furthermore, that monitor is required to fulfill the requirements for the Near-road regulations.

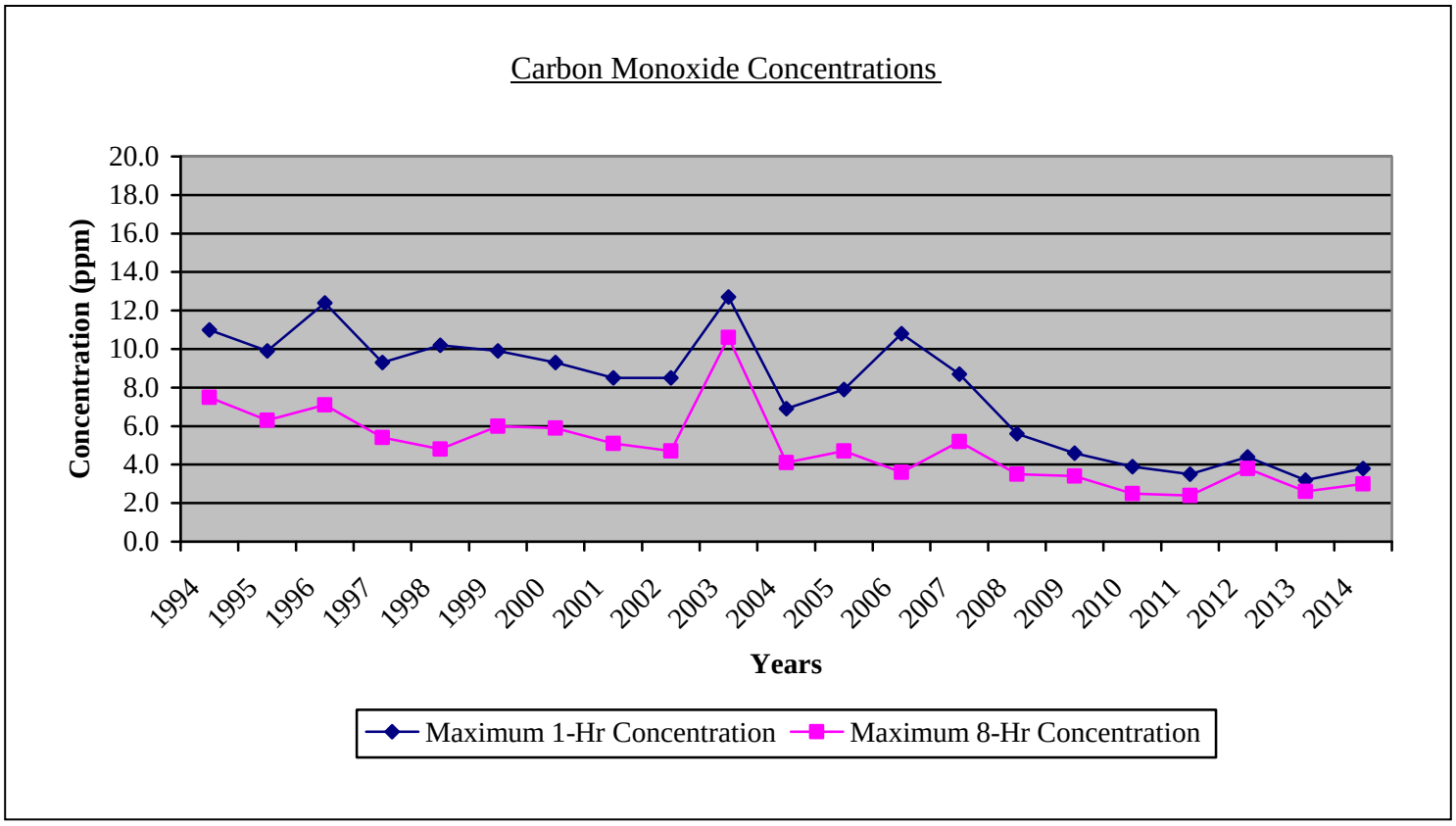
Chapter 6.1.0 Carbon Monoxide – Trends in the SDAB

The peak 8-Hr indicator for carbon monoxide has steadily decreased over the years (Table 6.1) and is shown graphically in Figure 6.2. In 2003, the wildfires in the County caused the SDAB to exceed the standards for CO, but these exceedances are considered an exceptional event and do not have a lasting impact in the air basin. Exceptional events are still tallied in the accounting for attainment status. Even with the last two wildfires in 2003 and 2007, the County still qualifies for attainment status. Note that the "Days above the National Standard" row in Table 6.1 reflects the carbon monoxide standards for that year.

Table 6.1 Summary of Carbon Monoxide Concentrations, 1994-2014

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Maximum 1-Hr Concentration (ppm)	11.0	9.9	12.4	9.3	10.2	9.9	9.3	8.5	8.5	12.7	6.9	7.9	10.8	8.7	5.6	4.6	3.9	3.5	4.4	3.2	3.8
Maximum 8-Hr Concentration (ppm)	7.5	6.3	7.1	5.4	4.8	6.0	5.9	5.1	4.7	10.6	4.1	4.7	3.6	5.2	3.5	3.4	2.5	2.4	3.8	2.6	3.0
Days above the National Standard (#)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 6.2 Carbon Monoxide Concentrations, 1994-2014



Chapter 6.1.1 Carbon Monoxide - Measurements by Site

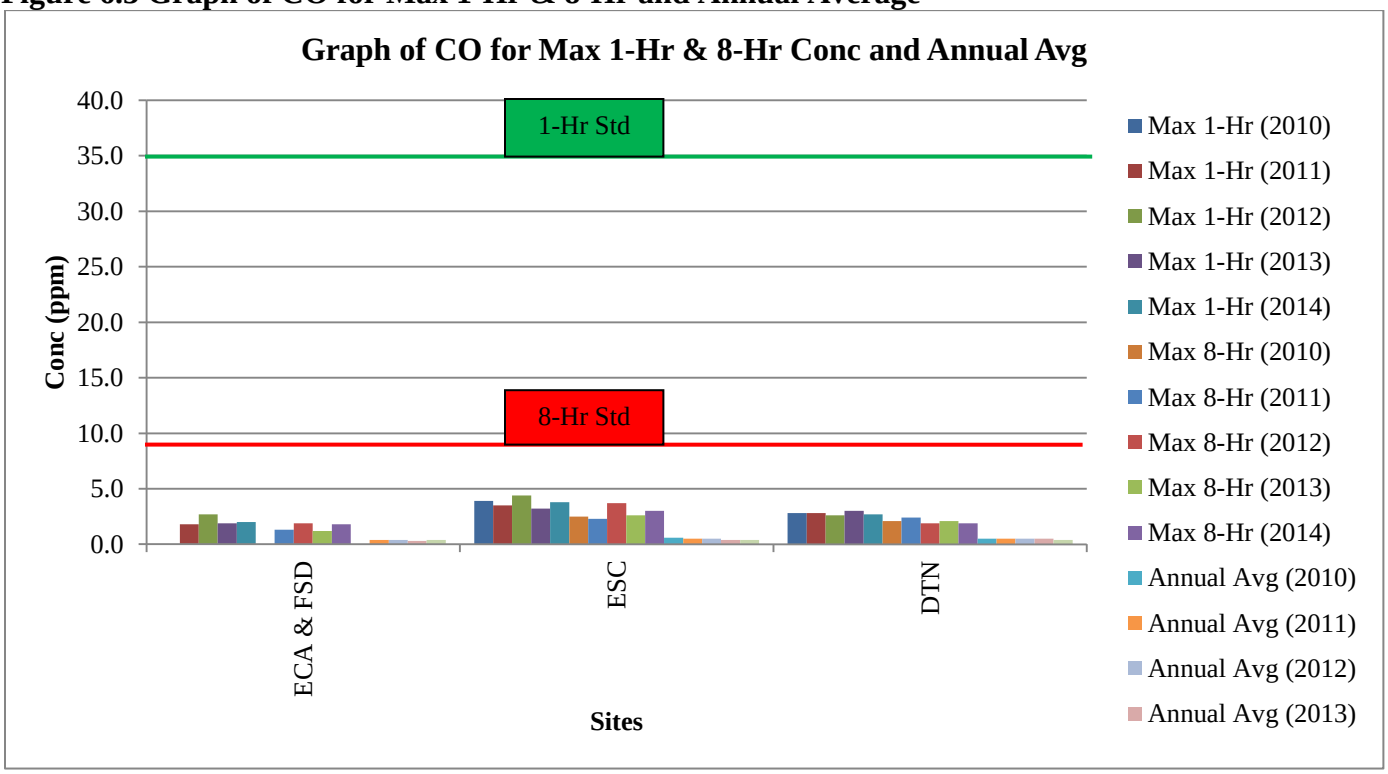
Table 6.2 lists the maximum carbon monoxide measurements for each carbon monoxide monitoring location and NCore. Figure 6.3 shows this information graphically with respect to the 1-Hr and 8-Hr Stds for 2015 (35 and 9 ppm, respectively).

Table 6.2 Carbon Monoxide by Site, 2010-2014

Site (name)		Maximum Concentration for 1-Hr (ppm)					Maximum Concentration for 8-Hr (ppm)					Annual Average (ppm)				
		2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
El Cajon	ECA & FSD	**	1.8	2.7	1.9	2.0	**	1.3	1.9	1.2	1.8	**	0.4	0.4	0.3	0.4
Escondido	ESC	3.9	3.5	4.4	3.2	3.8	2.5	2.3	3.7	2.6	3.0	0.6	0.5	0.5	0.4	0.4
SD-Beardsley	DTN	2.8	2.8	2.6	3.0	2.7	2.1	2.4	1.9	2.1	1.9	0.5	0.5	0.5	0.5	0.4

** Not operational

Figure 6.3 Graph of CO for Max 1-Hr & 8-Hr and Annual Average



Chapter 6.2.0 Carbon Monoxide – Federal Design Criteria Requirements

The Federal requirements for the number of carbon monoxide monitors are described in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.2 "Carbon Monoxide (CO) Design Criteria". For the NCore pollutants, see 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 3, "Design Criteria for NCore Sites", subsection (b).

Chapter 6.2.1 Carbon Monoxide Design Criteria for Near-road Requirements

The requirements needed to fulfill Design Criteria for CO monitoring are described in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.2 "Carbon Monoxide (CO) Design Criteria", subsection 4.2.1. Table 6.3a lists these requirements.

Table 6.3a Carbon Monoxide Minimum Number of Near-road Monitors Required

MSA (name)	County (name)	Population from 2010 Census (#)	Minimum Number of NO_2 Monitors Required (#)	Are Collocated CO Monitors Required (yes/no)	Minimum Number of Collocated CO Monitors Required (#)	Total Number of CO Monitors Required (#)	Total Number of Active CO Monitors (#)	Total Number of CO Monitors Needed (#)
San Diego	San Diego	3.2 million	2	Yes	1	1	1	0

Chapter 6.2.2 Carbon Monoxide –CO Trace Level Monitoring for NCore

CFR Part 58-"Ambient Air Quality Surveillance", Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 3, "Design Criteria for NCore Sites", subsection (b) describes the requirements needed to fulfill Design Criteria for CO trace level monitoring. Table 6.3b lists these requirements.

Table 6.3b Carbon Monoxide Design Criteria for NCore Requirements

MSA (name)	County (name)	Minimum Number of NCore CO-TLE Monitors Required (#)	Number of Active NCore CO-TLE Monitors (#)	Number of NCore CO-TLE Monitors Needed (#)	Meet NAAQS? (yes/no)
San Diego	San Diego	1	1	None	Yes

Chapter 6.2.3 Carbon Monoxide Design Criteria for State Implementation Plan (SIP)

The District is required to operate at least one non-NCore Carbon monoxide monitor to fulfill the State Implementation Maintenance Plan (SIPM). Table 6.3c lists this requirement.

Table 6.3c Carbon Monoxide Design Criteria for SIP Requirements

MSA (name)	County (name)	Minimum Number of Non-NCore CO Monitors Required for the SIPM (#)	Number of Actual Non-NCore CO Monitors (#)	Number of Non-NCore CO Monitors Needed (#)	Location of non-NCore CO SIP Monitor (name)	Meet NAAQS? (yes/no)
San Diego	San Diego	1	1	None	Downtown 06-073-1010	Yes

Chapter 6.3.0 CO Monitor and Station Evaluation Summary

The EPA does not have Network Assessment tools available for CO monitor and station comparison, so the District used a multilayered approach to evaluate the CO monitors. Table 6.4 is a summary of the multilayered approach for evaluating CO monitors and stations. No CO monitor is recommended for decommissioning.

Table 6.4 CO Monitor Summary Rating

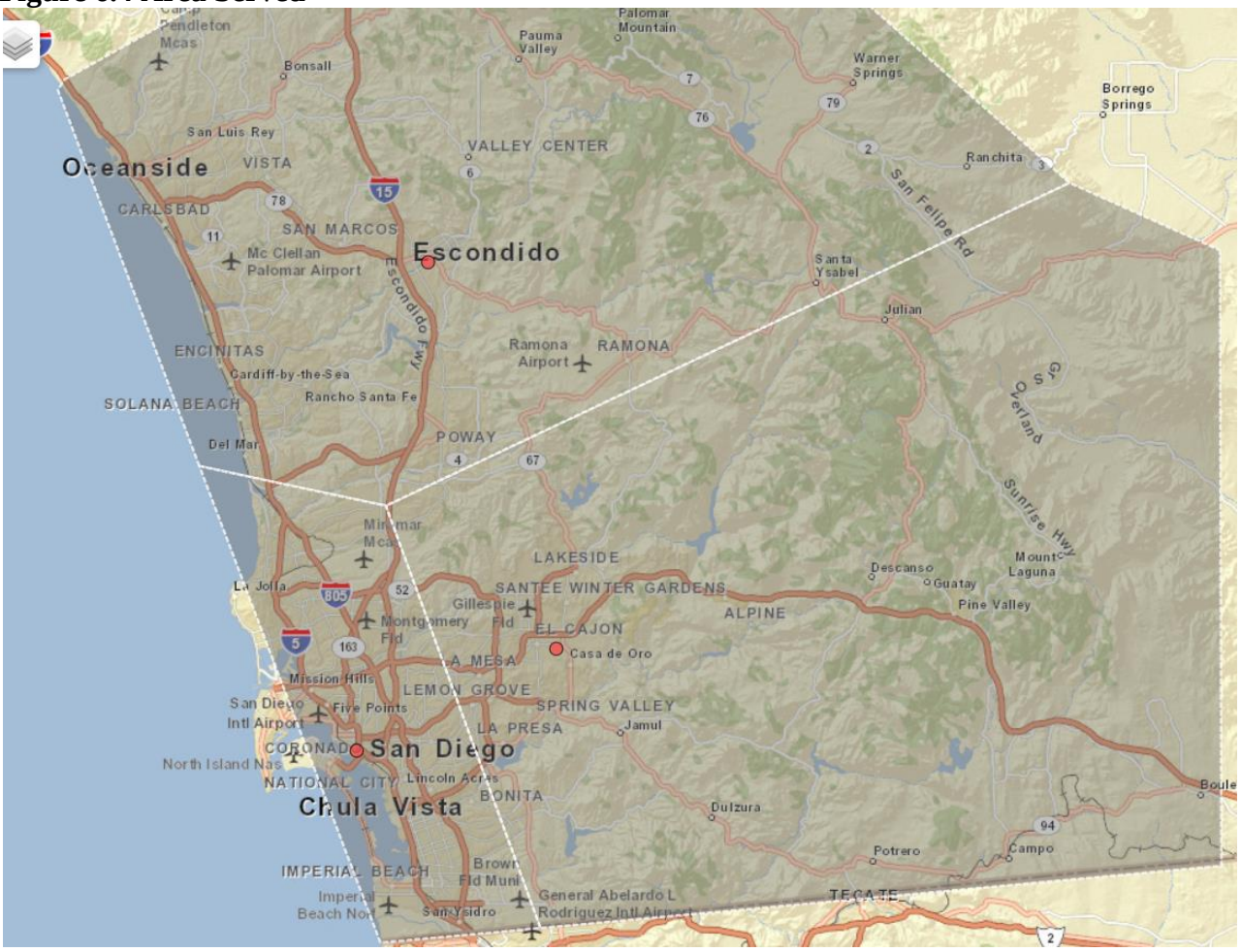
	Overall Scoring	**COMMENTS**	**1.** Total Monitors	**2.** Community Type	**3.** QA/QC Needs	**4.** Other
El Cajon (ECA)	**34**	**1:** n/a **2:** Light Industrial/mixed use **3:** n/a **4:** Required for NCore; recently moved	17	7	0	10
Escondido (ESC)	**34**	**1:** n/a **2:** Light Industrial/mixed use **3:** Compare to Near-road at RCD; Highest concentrations in the network **4:** For Exceptional Events for wildfires	9	9	7	8
Rancho Carmel Drive (RCD)	**27**	**1:** n/a **2:** Bedroom **3:** Compare to ESC **4:** Required for Near-road	2	9	6	10
San Diego-Beardsley (DTN)	**34**	**1:** n/a **2:** Heavy Industrial/mixed use **3:** Compare to Near-road **4:** EJ site and SIPM monitor	10	10	8	8
Proposed 2nd Near-road Site	**25**	**1:** n/a **2:** Mixed use **3:** PM2.5 **4:** PAMS trends; recently moved	2	5	8	10

Chapter 6.3.1 CO Monitor and Station Evaluation Explanation

Three of the four CO monitors currently in the air pollution monitoring network are either state or federally required (They are located at the El Cajon, Downtown, and Rancho Carmel Drive stations). The CO monitor at Escondido is the longest running one in the network. It is instrumental for trends analysis. In addition, it is located downwind of areas that have a high potential for wildfires (and did monitor the wildfires of 2003 and 2007). Figure 6.4 illustrates how much of the fire zone/wildfire areas are covered by the Escondido CO monitor. The data from this monitor help to establish "Special Event" exceptions for such occurrences in the future. Additionally, the District will compare Near-road CO data to ambient CO data at Rancho Carmel Drive and Escondido, respectively. Lastly, the District will establish CO monitoring at the 2nd Near-road location, if it is in or near the Barrio Logan Downtown station.

The EPA has requested that the District site a CO monitor at the 2nd Near-road station. With the addition of the 2nd Near-road CO monitor (which is not required), the District will have four (4) monitors as part of the ambient air monitoring network, which require a different calibration and audit frequency than the NCore CO instrumentation. Due to the EPA audit frequency requirements; there is a scheduling savings, logistically, if the network has four monitors. All non-NCore CO monitors will be retained.

Figure 6.4 Area Served



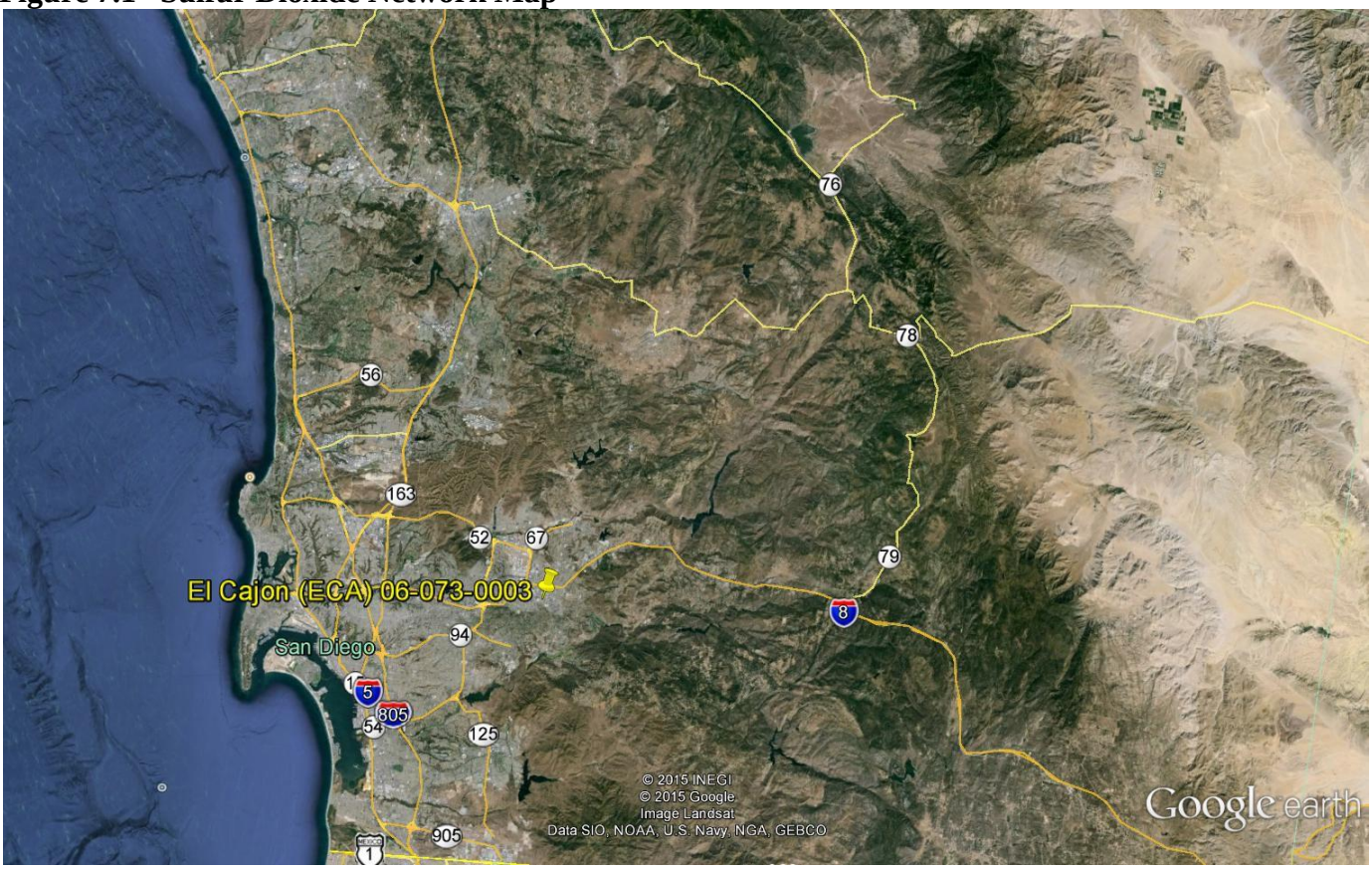
Chapter 7 Sulfur Dioxide (SO_2)

Section 7.0.0 Sulfur Dioxide Introduction

Only trace level sulfur dioxide is sampled at one location in the SDAB (Figure 7.1). Trace-level SO_2 was sampled at the El Cajon-NCore site. Please note:

- The El Cajon station was temporarily relocated to the Gillespie Field area off of Floyd Smith Drive; this station is called Floyd Smith Drive (FSD).

Figure 7.1 Sulfur Dioxide Network Map



The reported concentrations reflect a mix of the station move listed above. Because the Floyd Smith Drive relocation is temporary, the maps and table parameters reflect the permanent site metadata (labeled as ECA).

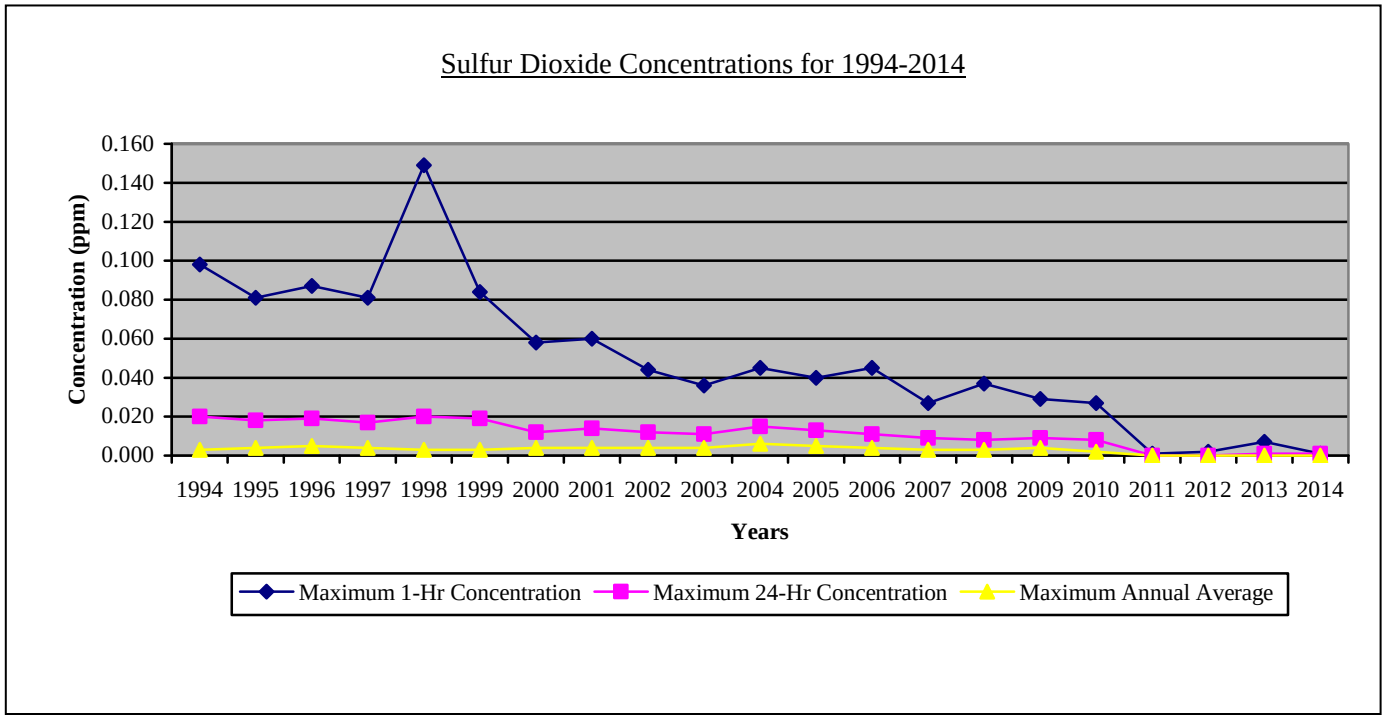
Section 7.1.0 Sulfur Dioxide Trends in the SDAB

Emissions of SOx have declined tremendously in California over the last 20 years. A major constituent of SOx is sulfur dioxide (SO_2). SO_2 emissions from stationary sources and from land-based on- and off-road gasoline and diesel-fueled engines and vehicles have decreased due to improved source controls and switching from fuel oil to natural gas for electric generation and industrial boilers. Note that the "Days above National Standard" row in Table 7.1 reflects the SO_2 standards for that year.

Table 7.1 Summary of Sulfur Dioxide Concentrations, 1994-2014

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Maximum 1-Hr Concentration (ppm)	0.098	0.081	0.087	0.081	0.149	0.084	0.058	0.060	0.044	0.036	0.045	0.040	0.045	0.027	0.037	0.029	0.027	0.001	0.002	0.007	0.001
Maximum 24-Hrs Concentration (ppm)	0.020	0.018	0.019	0.017	0.020	0.019	0.012	0.014	0.012	0.011	0.015	0.013	0.011	0.009	0.008	0.009	0.008	0.000	0.000	0.001	0.001
Maximum Annual Average (ppm)	0.003	0.004	0.005	0.004	0.003	0.003	0.004	0.004	0.004	0.004	0.006	0.005	0.004	0.003	0.003	0.004	0.002	0.000	0.000	0.000	0.000
Days above the National Standard (#)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 7.2 Sulfur Dioxide Concentrations, 1994-2014



Section 7.1.1 Sulfur Dioxide Measurements by Site, Yearly 2010 - 2014

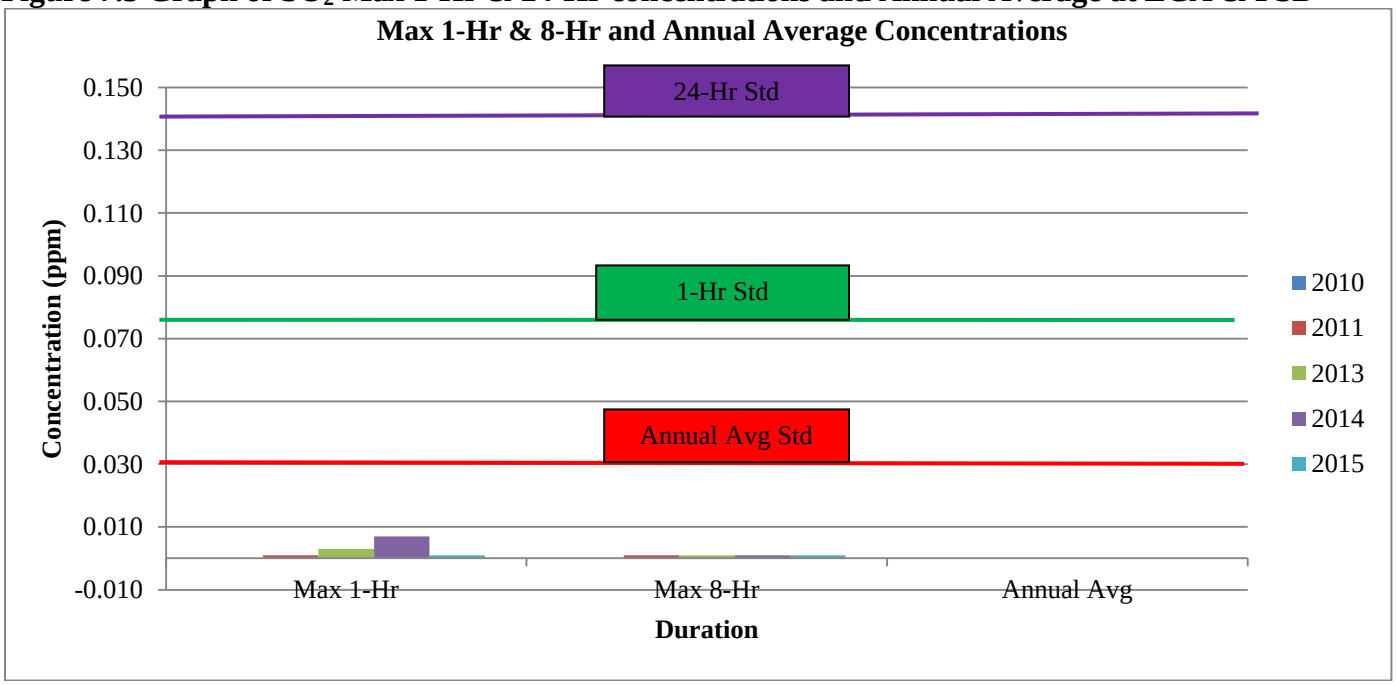
Table 7.2a lists the maximum sulfur dioxide measurements for the NCore monitoring location. Figure 7.3 shows this graphically with respect to the 1-Hr, 24-Hr, and Annual Avg Stds for 2015 (0.075, 0.140, 0.030 ppm, respectively).

Table 7.2a Sulfur Dioxide Measurements by Site, 2010 - 2014

Site (name)		Maximum Concentration for 1-Hr (ppm)					Maximum Concentration for 24-Hrs (ppm)					Annual Average (ppm)				
		2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
El Cajon	ECA & FSD	**	0.001	0.003	0.007	0.001	**	0.001	0.001	0.001	0.001	**	0.000	0.000	0.000	0.000

**Not operational

Figure 7.3 Graph of SO_2 Max 1-Hr & 24-Hr concentrations and Annual Average at ECA & FSD



Section 7.1.2 Sulfur Dioxide Measurements by Site, Design Value

Table 7.2b lists the maximum sulfur dioxide measurements for the NCore monitoring location.

Table 7.2b Sulfur Dioxide Measurements by Site, Design Value 2012-2014

Site (site)	Site Abbreviation	Design Value (2012-2014) Maximum Concentration 1-Hr (ppm)
El Cajon	ECA	0.002

Section 7.2.0 Sulfur Dioxide Design Criteria Requirements from the Code of Federal Regulations

The Federal requirements for the number of sulfur dioxide monitors are described in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.4 "Sulfur Dioxide (SO_2) Design Criteria".

The requirements for the number of sulfur dioxide monitors for the NCore pollutants are described in 40 CFR Part 58-"Ambient Air Quality Surveillance", Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 3, "Design Criteria for NCore Sites", subsection (b).

Section 7.2.1 Sulfur Dioxide Design Criteria

The requirements needed to fulfill the sulfur dioxide Design Criteria are described in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.4 "Sulfur Dioxide (SO_2) Design Criteria", subsection 4.4.2. Tables 7.3a-7.3c list these requirements.

According to the latest National Emissions Inventory (NEI) EPA Sector Database for 2011, the SDAB is listed as having SO_2 emissions of 1,099.9504 Tons/yr (TPY). The population of San Diego County is estimated to be 3.2 million persons (MP).

Using the Population Weighted Emissions Index (PWEI) equation from paragraph 4.4.2 in the CFR:

{ (3,200,000 million persons) x (1,100 tons/year of SO_2) } / (1,000,000) = 2,909 MP-TPY

Table 7.3a Sulfur Dioxide Inventory for the SDAB, 2014

MSA (name)	County (name)	Population from 2010 Census (#)	Total SO_2 Emissions From NEI (TPY)	Calculated PWEI (MP-TPY)
San Diego	San Diego	3.2 million	1,100	2,909

Table 7.3b Sulfur Dioxide Design Criteria for Minimum Number of Ambient Level (non-NCore) Monitors Needed

Calculated PWEI (MP-TPY)	Are the Emissions <5,000 MP-TPY? (yes/no)	Number of Required Ambient Monitors (#)	Number of Active Ambient Monitors (#)	Number of Ambient Monitors Needed (#)
2,909	Yes	0	0	None

Section 7.2.2 Sulfur Dioxide Design Criteria for Trace Level Monitoring for NCore

CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 3, "Design Criteria for NCore Sites", subsection (b) lists the requirements needed to fulfill Design Criteria for SO_2 trace level monitoring.

Table 7.3c Sulfur Dioxide Design Criteria for the Minimum Number of Trace Level (NCore) Monitors Needed

MSA	County	Minimum Number of NCore Monitors Required (#)	Number of Active NCore Monitors (#)	Number of NCore Monitors Needed (#)	Met NAAQS? (yes/no)
San Diego	San Diego	1	1	None	Yes

Section 7.3.0 SO_2 Monitor and Station Evaluation Summary

The EPA does not have Network Assessment tools available for SO_2 monitor and station comparison; however, no further analysis is necessary, because the District already operates the minimum number of SO_2 monitors allowed/required by EPA.

Section 7.3.1 SO_2 Monitor and Station Evaluation Explanation

The NCore SO_2 monitor is required. The annual average is routinely below 1 ppb, the maximum 24-hr concentration is routinely below 5 ppb, and the maximum 1-hr concentration is routinely below 10 ppb. The limits are 30 ppb, 140 ppb, and 75 ppb, respectively. This monitor is federally required, but it is not locally needed in the network to established attainment. The monitor has been in operation for more than three years and shows consistently near zero concentrations, if the EPA is looking to reduce expenditures, the elimination of the NCore SO_2 monitor in the San Diego air pollution monitoring network would be a viable candidate.

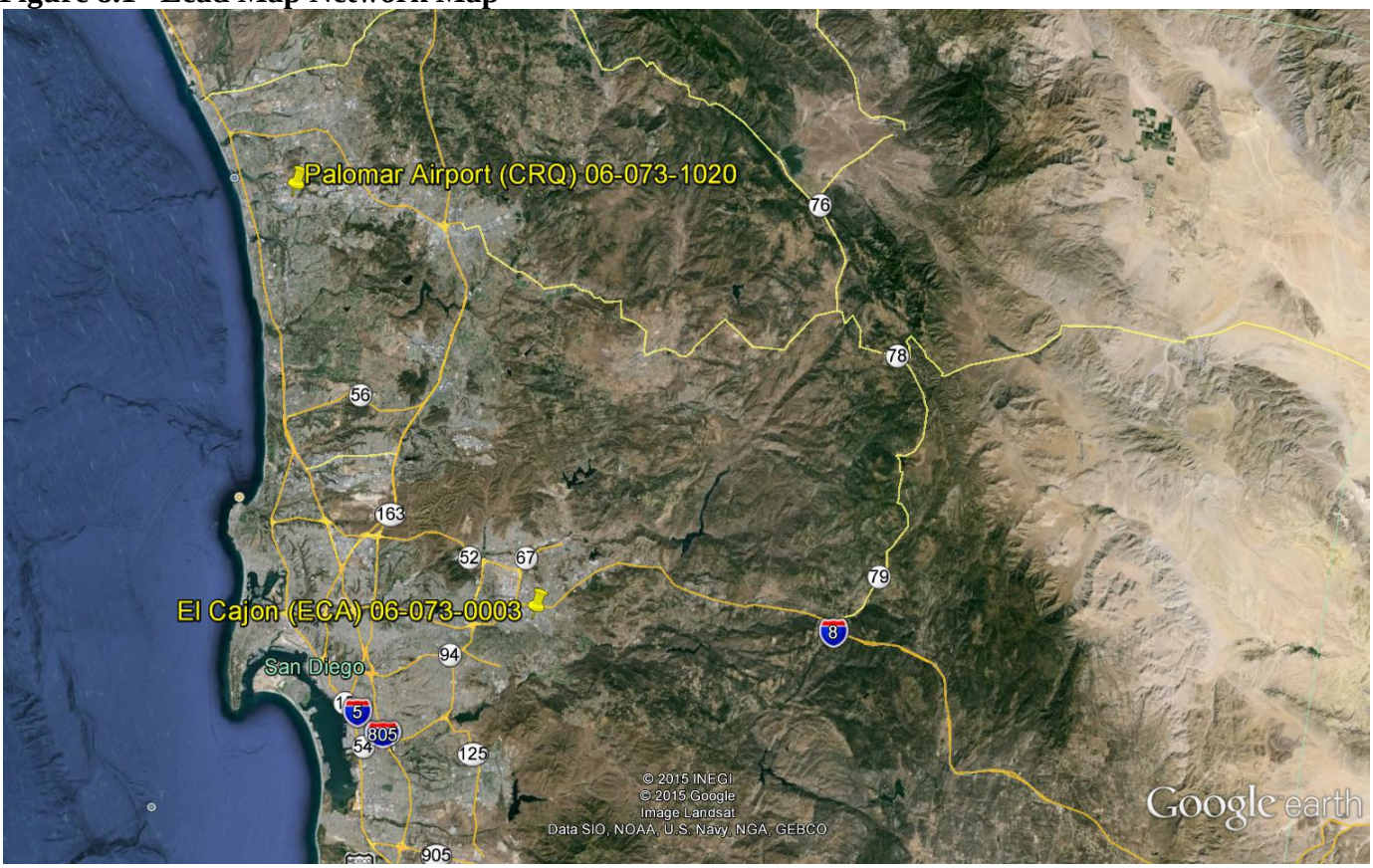
Chapter 8 Lead (Pb)

Section 8.0.0 Lead – Introduction

Lead (Pb) was sampled at two locations in the SDAB (Figure 8.1). Ambient level lead was sampled at the El Cajon location, as part of the NCore program. Source level lead was sampled at McClellan-Palomar airport. Please note:

- The El Cajon station was temporarily relocated to the Gillespie Field area off of Floyd Smith Drive; this station is called Floyd Smith Drive (FSD).

Figure 8.1 Lead Map Network Map



The reported concentrations reflect a mix of the station move listed above. Because the Floyd Smith Drive relocation is temporary, the maps and table parameters reflect the permanent site metadata (labeled as ECA).

The District sampled for lead at Palomar Airport, as part of the EPA Airport Testing program. This is microscale/non-ambient lead sampling and does not impact the Network Assessment report. For greater detail regarding this sampling, see the Annual Network Plans. Furthermore, there are no non-Airport sources that exceed any Federal requirement for additional lead testing in the San Diego Air Basin

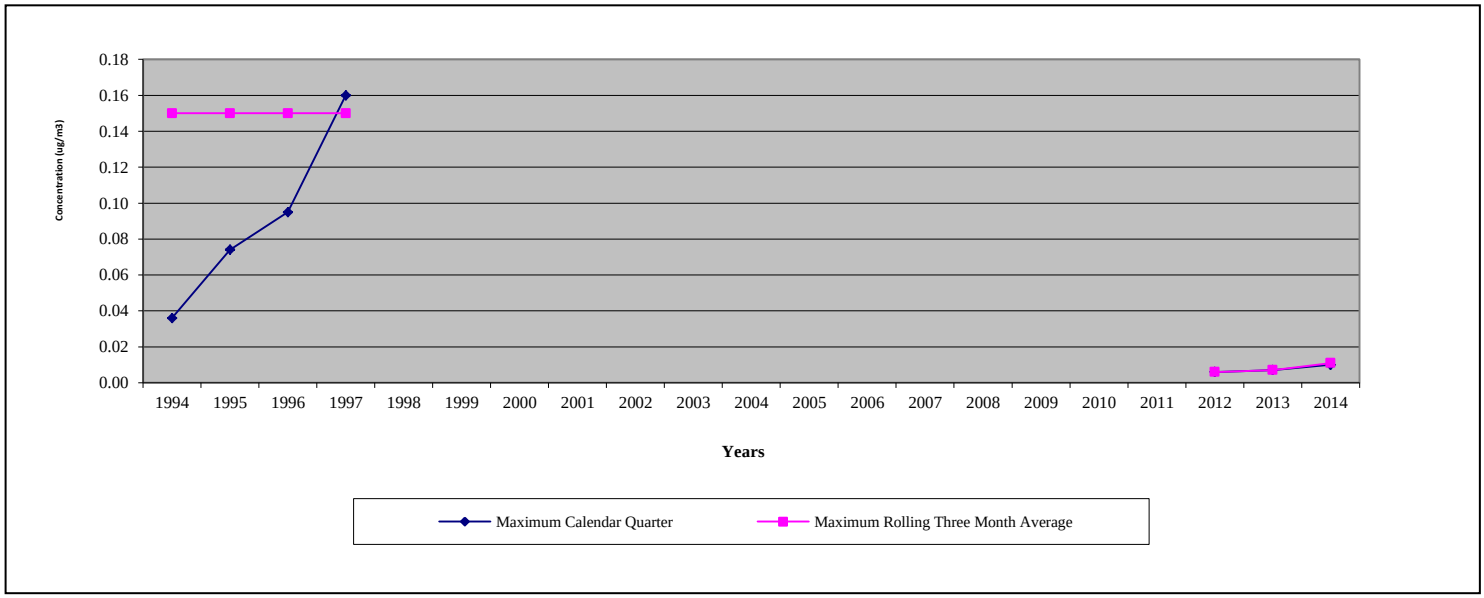
Section 8.1.0 Lead – Trends in the SDAB

The rapid decrease in lead emissions (Table 8.1) over the last 20 plus years can be attributed primarily to phasing out the lead in gasoline by the EPA and the ARB. This phase-out began during the 1970s, and subsequent regulations have eliminated all lead from the gasoline now sold in California for automotive vehicles. Note that Figure 8.2 and the "Days above the National Standard" row in Table 8.3 reflect the lead standard for that year. No Testing (NT) was conducted in the SDAB from 1997 until 2012. The measured concentrations for the 2012 are from the El Cajon (NCore) location, which is categorized as neighborhood scale and representative concentrations. Palomar Airport is a microscale/source oriented monitor.

Table 8.1 Lead Summary of Concentrations, 1994-2014

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Maximum Calendar Quarter	0.036	0.074	0.095	0.160	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.006	0.007	0.010
Maximum Rolling 3-Month Average	0.150	0.150	0.150	0.150	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.006	0.007	0.011
Days above the National Standard (#)	0	0	0	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0	0	0

Figure 8.2 Lead Concentrations, 1994-2014



Section 8.1.1 Lead - Measurements by Site

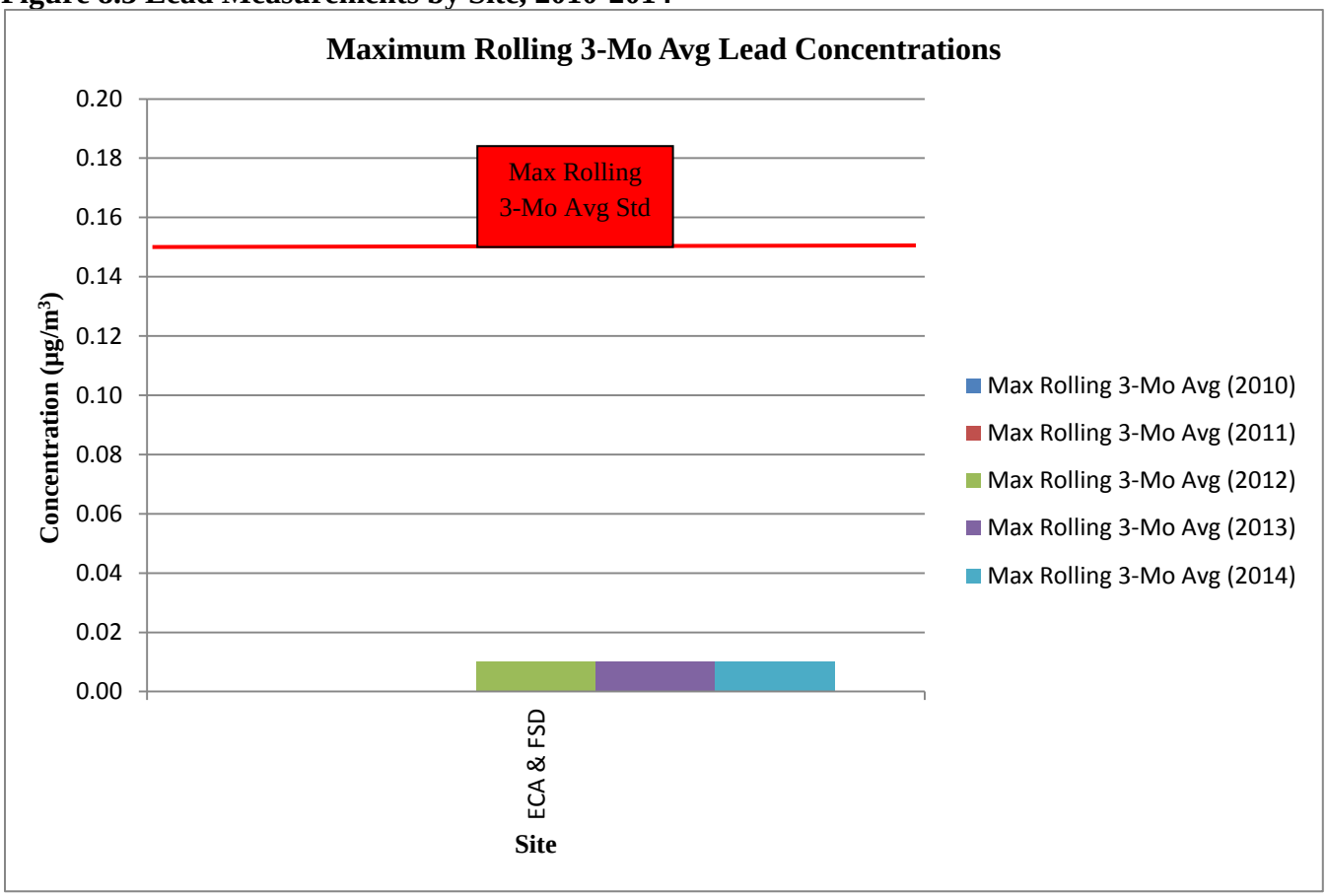
The CFR requires that for Pb data to be used in regulatory determinations of compliance with the Pb NAAQS, the Pb samplers must be sited according to Federal Regulations. Table 8.2 lists the maximum lead measurements for each lead monitoring location. Figure 8.3 show trends graphically with respect to the Rolling 3-Mo Std for 2015 (0.15 µg/m^3).

Table 8.2 Lead Measurements by Site, 2010-2014

Site (name)		Maximum Rolling 3-Month Average (µg/m^3)				
		2010	2011	2012	2013	2014
El Cajon	ECA & FSD	*	*	0.01	0.01	0.01

*Not required

Figure 8.3 Lead Measurements by Site, 2010-2014



Section 8.2.0 Lead Design Criteria Requirements from the Code of Federal Regulations

The Federal requirements for the number of lead monitors are described in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.5 "Lead (Pb) Design Criteria".

The requirements for the number of lead monitors for the NCore pollutants are described in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 3, "Design Criteria for NCore Sites", subsection (b).

Section 8.2.1 Non-Airport Lead Design Criteria, Sources (non-Airport and non-NCore)

The requirements necessary to fulfill the non-airport Pb source Design Criteria are described in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.5 "Lead (Pb) Design Criteria", subsection 4.5 (Table 8.3a lists these requirements).

Table 8.3a Lead Design Criteria for the Minimum Number of Source Level, non-NCore and non-Airport Monitors Needed Based on the NEI Database, 2014

MSA (name)	County (name)	Any Non-Airport Pb Sources >0.5 TPY? (yes/no)	Minimum Number of Ambient Monitors Required (#)	Number of Active Ambient Monitors (#)	Number of Ambient Monitors Needed (#)	Meet NAAQS? (yes/no)
San Diego	San Diego	No	None	None	None	Not Applicable

Section 8.2.2 Airport Lead Design Criteria

See the San Diego APCD's Annual Network Plan for detail

Section 8.2.3 NCore Lead Design Criteria

The requirements necessary to fulfill the NCore Pb source Design Criteria are described in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.5 "Lead (Pb) Design Criteria", subsection 4.5(c) (Table 8.3b).

The Pb-NCore monitor was established to satisfy Federal requirements for the sampling of airborne lead particulate at NCore locations. The sampler is designated as Population Exposure, Neighborhood scale, and Representative concentrations of the area served.

Table 8.3b Lead Design Criteria for the Minimum Number of NCore Monitors Needed

MSA (name)	County (name)	Population from 2010 Census (#)	Minimum Number of NCore Pb Monitors Required (#)	Number of Active NCore Pb Monitors (#)	Number of NCore Pb Monitors Needed (#)	NCore Site (name)	NCore Site AQS ID Number (#)
San Diego	San Diego	3.2 million	1	1	None	El Cajon (ECA)	06-073-0003

The Pb-NCore monitor satisfies Federal requirements for the sampling of airborne lead particulate at NCore locations. The sampler is designated as Population Exposure, Neighborhood scale, and Representative concentrations of the area served. Table 8.3c lists the maximum NCore concentrations for the year.

Table 8.3c Lead Design Criteria Emission Summaries for the NCore Monitor

Source Sites (name)	Maximum 3-Month Average ($\mu g/m^3$)	Meet NAAQS 2014? (yes/no)
El Cajon (ECA) & Floyd Smith Dr. (FSD)	0.01	Yes

Section 8.3.0 Lead (Pb) Monitor and Station Evaluation

The EPA does not have any Network Assessment tools available for Pb sampler and station comparison; however, no further analysis is necessary, because the District already operates the minimum number of Pb samplers required by EPA.

Section 8.3.1 Lead (Pb) Monitor and Station Evaluation Explanation

The NCore Pb sampler is required. The annual average is routinely around ambient air background levels. This monitor is federally required, but it is not needed locally in the network to establish attainment. If the EPA is looking to reduce expenditures, the elimination of the NCore Pb sampler in the San Diego air pollution monitoring network would be a viable candidate.

Chapter 9 Particulate Matter 2.5 µm ($PM_{2.5}$)

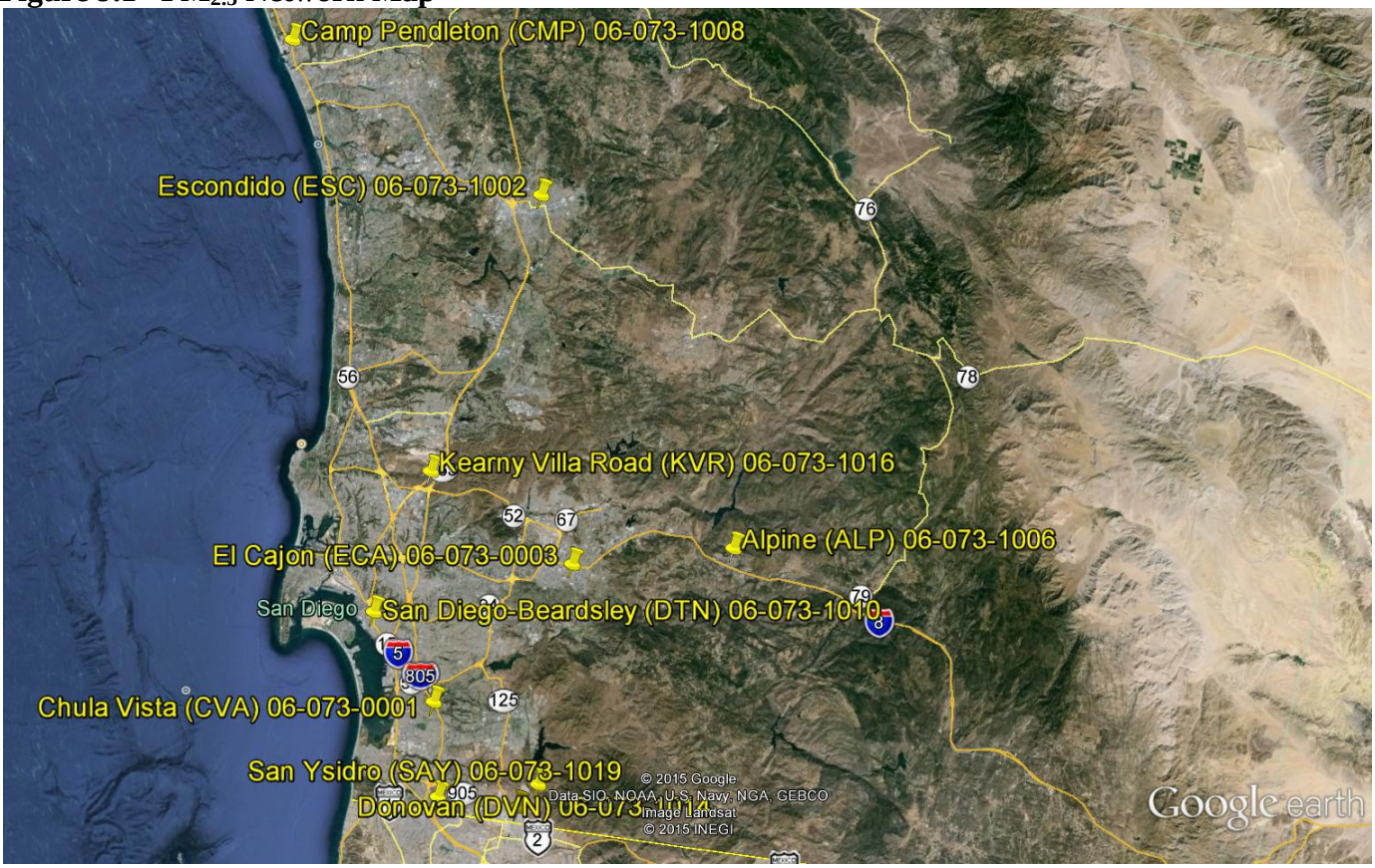
Section 9.0.0 $PM_{2.5}$ Introduction

$PM_{2.5}$ was sampled on both a continuous basis and sequentially (on a schedule set by the EPA) at several locations in the SDAB (Figure 9.1 & Table 9.1), and the resulting data were referenced to the $PM_{2.5}$ standards of the year, when applicable. The equipment is listed in Tables 9.1 and 9.2. Please note:

- The El Cajon station was temporarily relocated to the Gillespie Field area off of Floyd Smith Drive; this station is called Floyd Smith Drive (FSD).
- The Otay Mesa station was permanently relocated to the Donovan State Prison (DVN) area.

- $PM_{2.5}$ FRM/sequential samplers are at ESC, KVR, FSD/ECA, DTN, and CVA.
- $PM_{2.5}$ non-FEM/continuous samplers are at CMP, ESC, FSD/ECA, ALP, DVN, and DTN.
- $PM_{2.5}$-CSN samplers are at ESC and FSD/ECA.
- $PM_{2.5}$-STN samplers are at ESC and FSD/ECA.
- $PM_{2.5}$-Supplemental Speciation is at ESC, FSD/ECA, and DTN.

Figure 9.1 $PM_{2.5}$ Network Map



The reported concentrations reflect a mix of the two station moves listed above. Because the Donovan relocation is permanent, the maps and table parameters reflect the new site metadata (labeled as DVN). Because the Floyd Smith Drive relocation is temporary, the maps and table parameters reflect the permanent site metadata (labeled as ECA).

Section 9.1.0 $PM_{2.5}$ FRM Trends in the SDAB

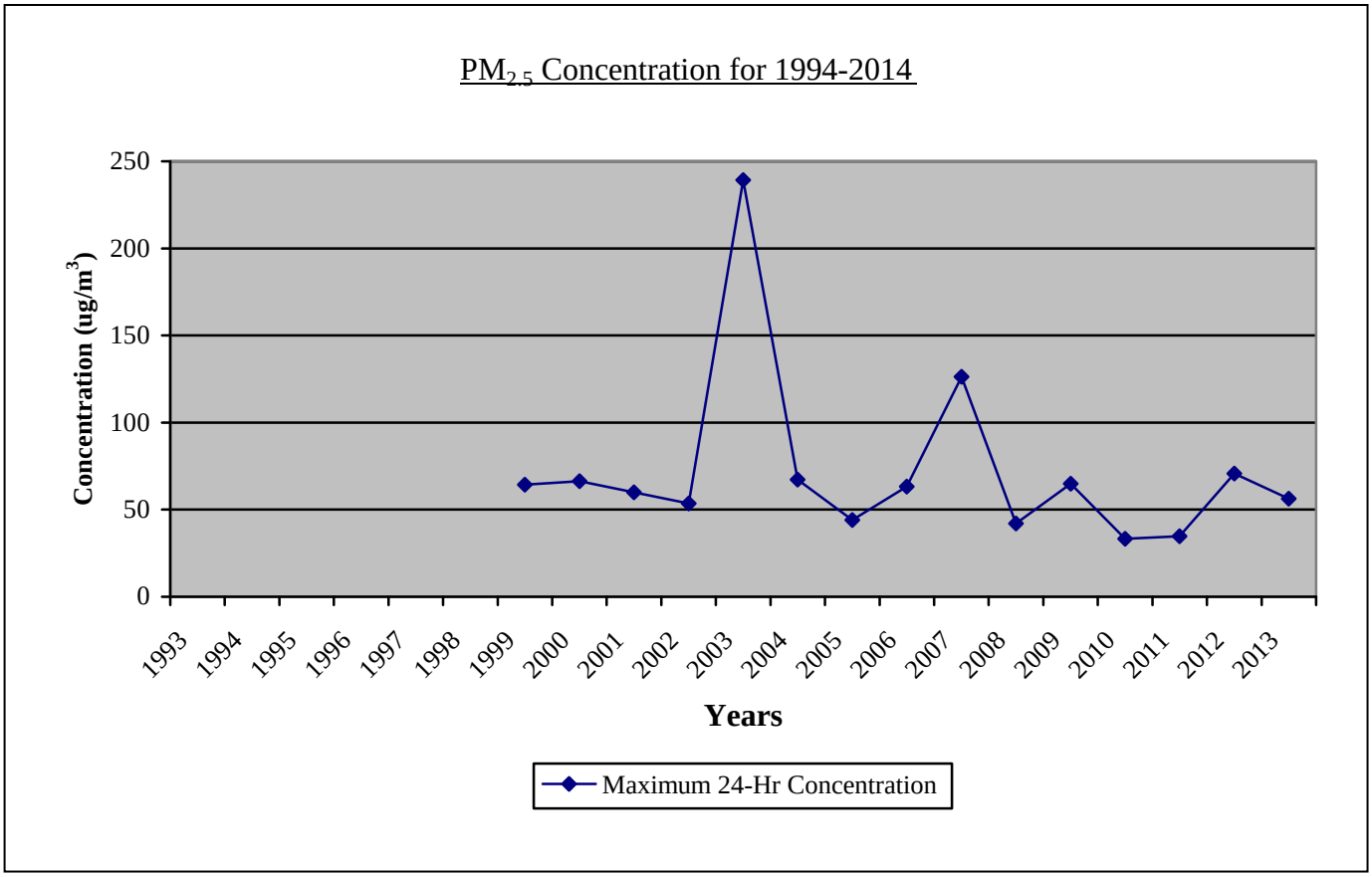
The annual average $PM_{2.5}$ FRM concentrations in the San Diego Air Basin have declined over the past decade, as shown in Table 9.1. The State annual average concentrations also decreased within this period. The maximum 24-Hr concentrations measured in 2003 and 2007 were due to severe wildfires that occurred in Southern California. The 98th percentile of 24-Hr $PM_{2.5}$ concentrations showed substantial variability within this period, a reflection of changes in meteorology and the influence of the 2003 and 2007 wildfires. Note that the "Days above the Standard" row in Table 9.3 reflects the $PM_{2.5}$ standard for that year. Figure 9.2 graphs the SDAB $PM_{2.5}$ trends over the years.

Table 9.1 $PM_{2.5}$ Summary of Concentrations, 1994-2014

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Maximum 24-Hr Concentration (µg/m^3)	*	*	*	*	*	64.3	66.3	60.0	53.6	239.2	67.3	44.1	63.3	126.2	42.0	64.95	33.3	34.7	70.7	56.3	36.7
Days above the National Std (#)	*	*	*	*	*	0	2	0	0	2	1	0	1	17	3	3	0	0	2	2	1

* The $PM_{2.5}$ standard was written in 1997 and the program was implemented in 1999

Figure 9.2 $PM_{2.5}$ Concentrations, 1994-2014



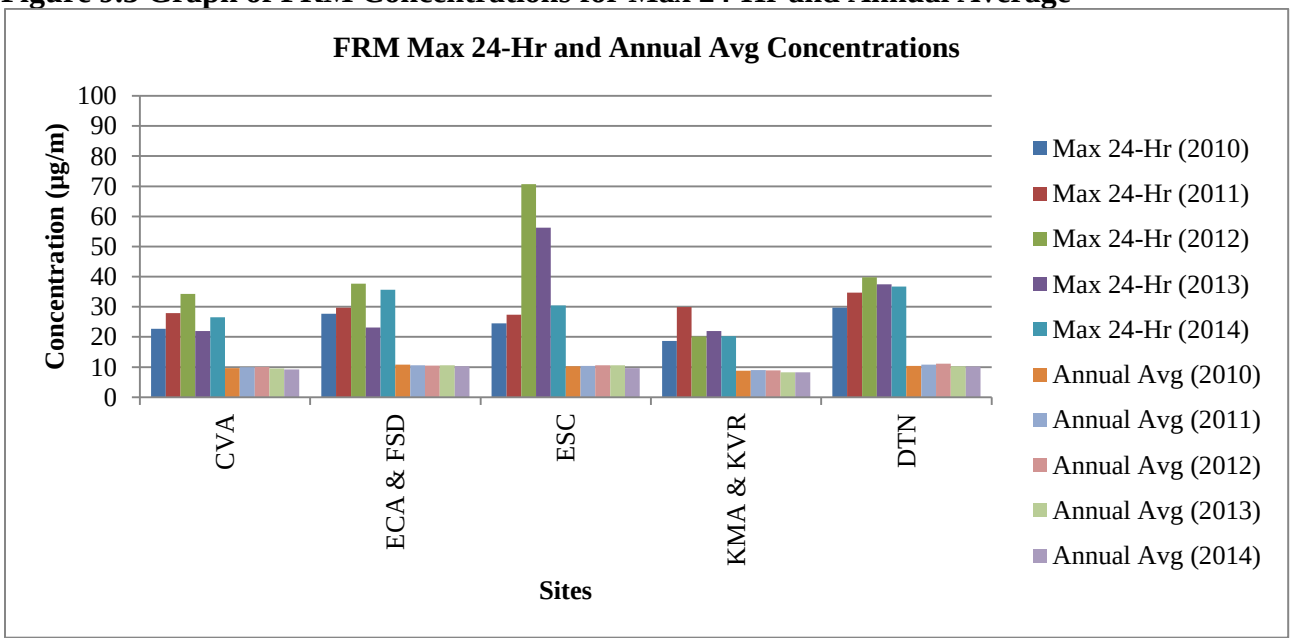
Section 9.1.1.1 $PM_{2.5}$ FRM/Manual Annual Measurements by Site

Table 9.2 lists the maximum $PM_{2.5}$ FRM measurements for each $PM_{2.5}$ FRM monitoring location. Figure 9.3 shows this graphically.

Table 9.2 $PM_{2.5}$ FRM/Manual Measurements by Site, 2010-2014

Site (name)		Maximum Concentration for 24-Hr (µg/m³)					Annual Average (µg/m³)				
		2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
Chula Vista	CVA	22.7	27.9	34.3	21.9	26.5	9.6	10.0	10.1	9.5	9.2
El Cajon	ECA & FSD	27.7	29.7	37.7	23.1	35.7	10.8	10.6	10.5	10.6	10.3
Escondido	ESC	24.5	27.4	70.7	56.3	30.4	10.3	10.4	10.6	10.6	9.6
Kearny Villa Road	KMA & KVR	18.7	29.9	20.1	22.0	20.2	8.8	9.0	8.9	8.3	8.2
San Diego-Beardsley	DTN	29.7	34.7	39.8	37.4	36.7	10.4	10.8	11.1	10.3	10.2

Figure 9.3 Graph of FRM Concentrations for Max 24-Hr and Annual Average



Section 9.1.1.2 $PM_{2.5}$ FRM/Manual Design Value Measurements by Site

Tables 9.3a and 9.9.3b list the maximum $PM_{2.5}$ FRM Design Value measurements for each $PM_{2.5}$ FRM monitoring location with respect to the National Standard for the annual average and maximum 24-Hr concentrations. Figures 9.4 & 9.5 show this graphically with respect to the Design Value 24-Hr Concentration for 2015 (35 µg/m^3).

Table 9.3a $PM_{2.5}$ FRM/Manual Design Value Measurements by Site (24-Hr), 2010-2014

Site (name)		Design Value Maximum Concentration for 24-Hr (µg/m^3)									
		2008-2010	≥ 85% of the NAAQS	2009-2011	≥ 85% of the NAAQS	2010-2012	≥ 85% of the NAAQS	2011-2013	≥ 85% of the NAAQS	2012-2014	≥ 85% of the NAAQS
Chula Vista	CVA	23.9	No	20.7	No	21.0	No	20.0	No	20.2	No
El Cajon	ECA & FSD	25.2	No	22.4	No	22.2	No	21.2	No	24.0	No
Escondido	ESC	24.4	No	22.4	No	20.9	No	22.3	No	21.9	No
Kearny Villa Road	KVR & KMA	20.1	No	18.0	No	17.1	No	17.0	No	17.3	No
San Diego-Beardsley	DTN	25.4	No	23.6	No	23.2	No	22.1	No	22.8	No

Figure 9.4 Graph of FRM Concentrations for Design Value Max 24-Hr Concentrations

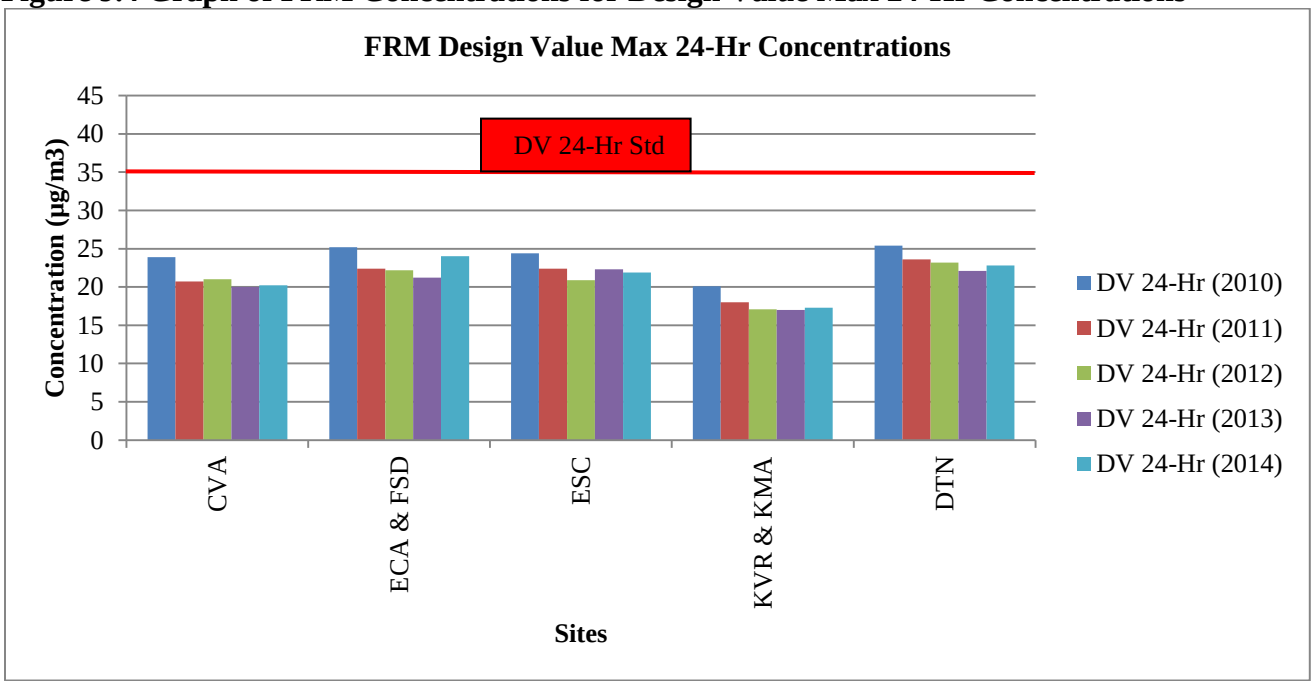
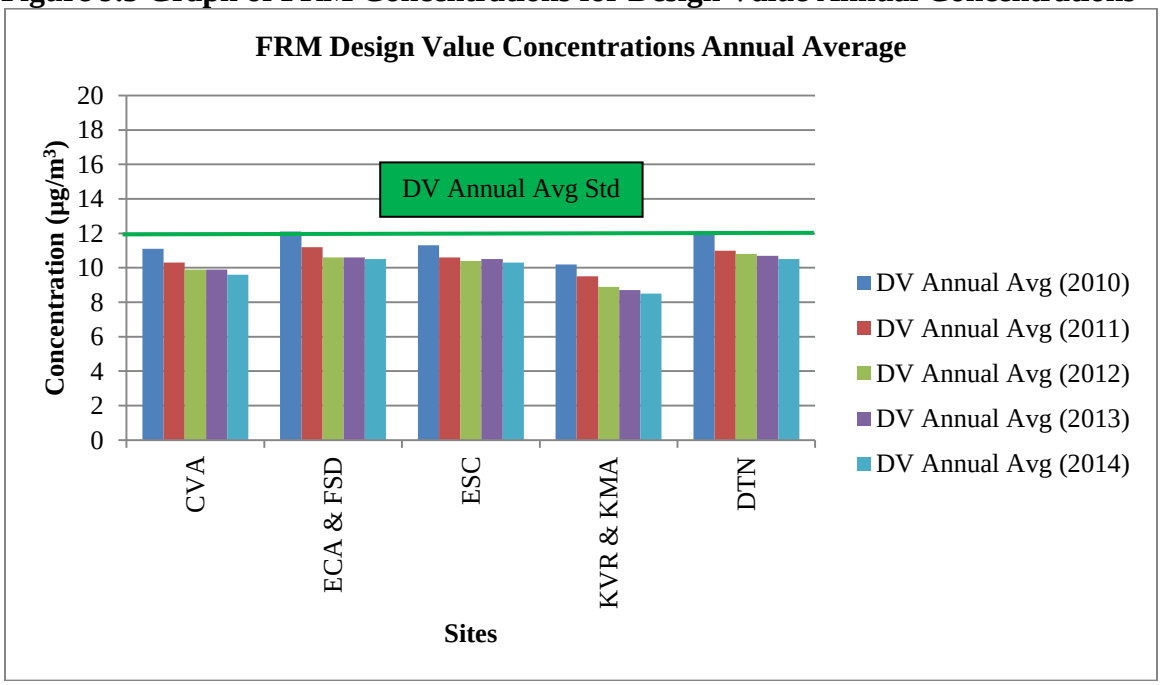


Table 9.3b $PM_{2.5}$ FRM/Manual Design Value Measurements by Site (Annual Average), 2010-2014

Site (name)		Design Value Annual Concentration (µg/m³)									
		2008-2010	≥ 85% of the NAAQS	2009-2011	≥ 85% of the NAAQS	2010-2012	≥ 85% of the NAAQS	2011-2013	≥ 85% of the NAAQS	2012-2014	≥ 85% of the NAAQS
Chula Vista	CVA	11.1	Yes	10.3	Yes	9.9	No	9.9	No	9.6	No
El Cajon	ECA & FSD	12.1	Yes	11.2	Yes	10.6	Yes	10.6	Yes	10.5	Yes
Escondido	ESC	11.3	Yes	10.6	Yes	10.4	Yes	10.5	Yes	10.3	Yes
Kearny Villa Road	KVR & KMA	10.2	Yes	9.5	No	8.9	No	8.7	No	8.5	No
San Diego-Beardsley	DTN	12.0	Yes	11.0	Yes	10.8	Yes	10.7	Yes	10.5	Yes

Figure 9.5 Graph of FRM Concentrations for Design Value Annual Concentrations



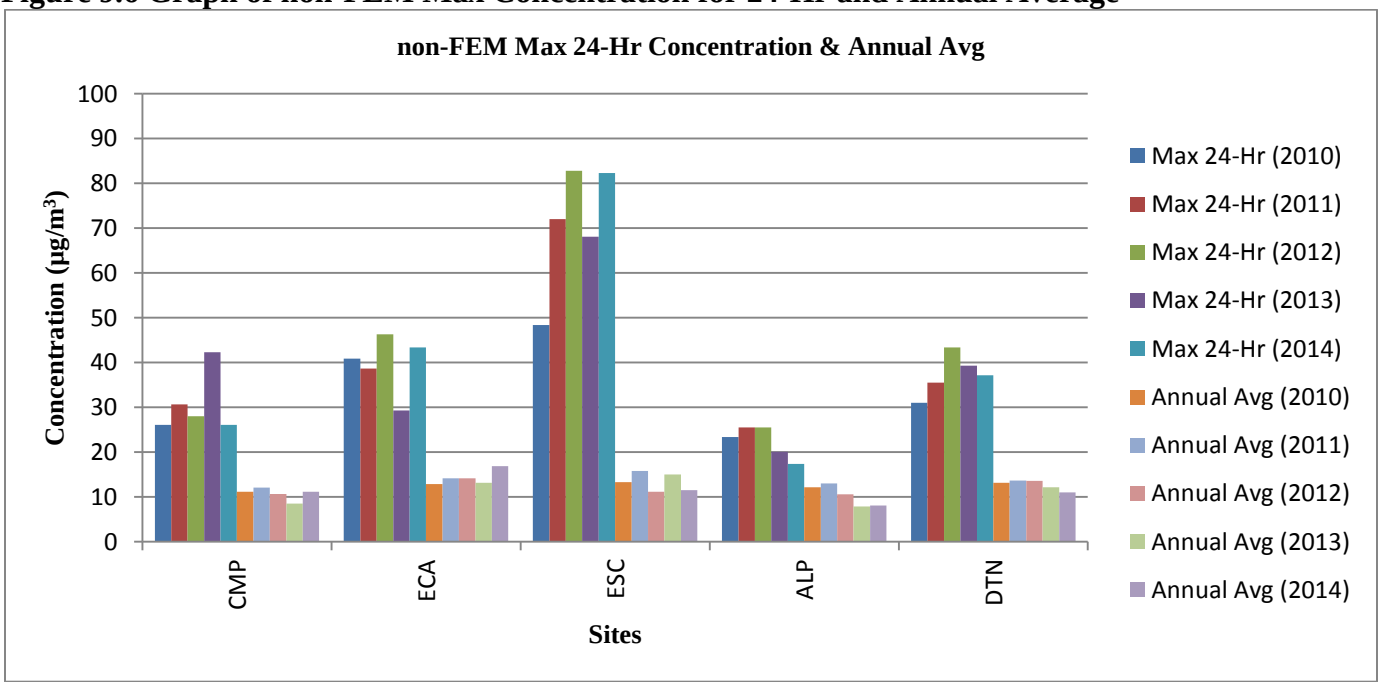
Section 9.1.2.1 $PM_{2.5}$ Non-FEM/Continuous Annual Measurements by Site

Table 9.4a lists the maximum $PM_{2.5}$ non-FEM measurements for each $PM_{2.5}$ continuous monitoring location. The $PM_{2.5}$ continuous sampler is not a regulatory monitor; therefore, its values cannot be compared to the standards. Figure 9.6 shows this graphically (All $PM_{2.5}$ continuous samplers are non-FEM, therefore they cannot be compared to the federal standards).

Table 9.4a $PM_{2.5}$ Non-FEM/Continuous Measurements by Site, 2010-2014

Site (name)		Maximum Concentration for 24-Hr (µg/m³)					Annual Average (µg/m³)				
		2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
Camp Pendleton	CMP	26.1	30.7	28.0	42.3	26.1	11.2	12.1	10.7	8.5	11.2
El Cajon	ECA	40.9	38.7	46.3	29.3	43.4	12.9	14.2	14.2	13.2	16.9
Escondido	ESC	48.4	72.0	82.8	68.1	82.3	13.3	15.8	11.2	15.0	11.5
Alpine	ALP	23.4	25.5	25.5	20.1	17.4	12.2	13.0	10.6	7.9	8.1
San Diego-Beardsley	DTN	31.0	35.5	43.4	39.3	37.2	13.2	13.7	13.6	12.2	11.0

Figure 9.6 Graph of non-FEM Max Concentration for 24-Hr and Annual Average



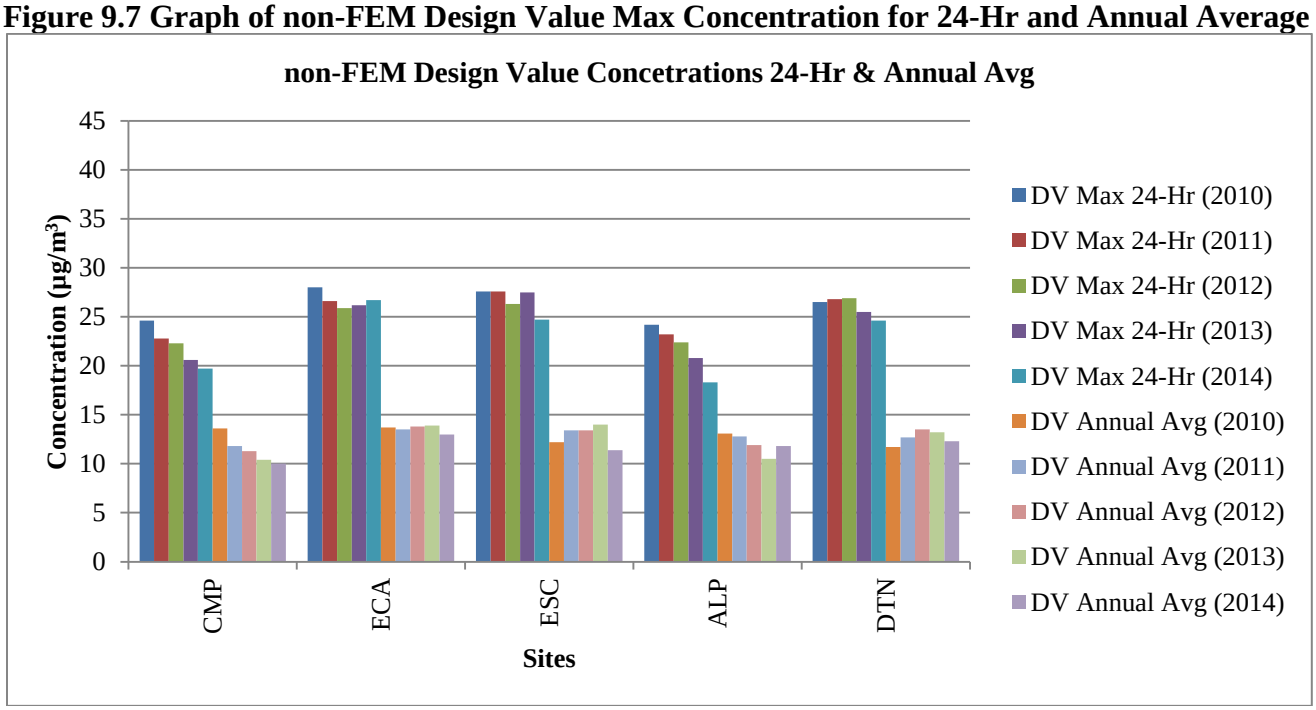
Section 9.1.2.2 $PM_{2.5}$ Non-FEM/Continuous Design Value Measurements by Site

Table 9.4b lists the maximum $PM_{2.5}$ non-FEM Design Value measurements for each $PM_{2.5}$ continuous monitoring location. The $PM_{2.5}$ continuous sampler is not a regulatory monitor; therefore, its values cannot be compared to the standards. Figure 9.7 shows this graphically (All $PM_{2.5}$ continuous samplers are non-FEM, therefore they cannot be compared to the federal standards)..

Table 9.4b $PM_{2.5}$ Non-FEM/Continuous Design Value Measurements by Site (24-Hr & Annual Avg), 2014

Site (name)		Design Value Concentration 24-Hr (µg/m³)					Design Value Concentration Annual (µg/m³)				
		2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014
Camp Pendleton	CMP	24.6	22.8	22.3	20.6	19.7	13.6	11.8	11.3	10.4	10.01
El Cajon	ECA	28.0	26.6	25.9	26.2	26.7	13.7	13.5	13.8	13.9	13.0
Escondido	ESC	27.6	27.6	26.3	27.5	24.7	12.2	13.4	13.4	14.0	11.4
Alpine	ALP	24.2	23.2	22.4	20.8	18.3	13.1	12.8	11.9	10.5	11.8
San Diego-Beardsley	DTN	26.5	26.8	26.9	25.5	24.6	11.7	12.7	13.5	13.2	12.3

Figure 9.7 Graph of non-FEM Design Value Max Concentration for 24-Hr and Annual Average



Section 9.2.0 $PM_{2.5}$ Federal Design Criteria Requirements

The Federal requirements for the number of $PM_{2.5}$ monitors are described in the 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.7 "Fine Particulate Matter ($PM_{2.5}$) Design Criteria" and 4.8 "Coarse Particulate Matter (PM10−2.5) Design Criteria".

Section 9.2.1 $PM_{2.5}$ FRM/Manual Design Criteria

Subsection 4.7.1 of 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.7 "Fine Particulate Matter ($PM_{2.5}$) Design Criteria" lists the requirements needed to fulfill the $PM_{2.5}$ Design Criteria for sequential/FRM (manual) samplers, using *Table D-5*. Tables 9.5a-9.5b list these requirements.

Table 9.5a $PM_{2.5}$ FRM/Manual Annual Design Value, 2012-2014

Annual Design Value (µg/m^3)	Annual Design Value Location (name)	Annual Design Value Site AQS ID (#)	Is the Annual Design Value ≥ 85% of the NAAQS? (yes/no)	Is the Annual Design Value < 85% of the NAAQS? (yes/no)	Does the Annual Design Value Meet the NAAQS? (yes/no)
10.5	San Diego (DTN)	06-073-1010	Yes	No	Yes

Table 9.5b $PM_{2.5}$ FRM/Manual 24-Hr Design Value, 2012-2014

24-Hr Design Value (µg/m^3)	24-Hr Design Value Location (name)	24-Hr Design Value Site AQS ID (#)	Is the 24-Hr Design Value ≥ 85% of the NAAQS? (yes/no)	Is the 24-Hr Design Value < 85% of the NAAQS? (yes/no)	Does the 24-Hr Design Value Meet the NAAQS? (yes/no)
22.8	San Diego (DTN)	06-073-1010	No	Yes	Yes

Using EPA *Table D-5*

Table 9.5c Minimum Number of $PM_{2.5}$ FRM/Manual Monitors/Sites Required

MSA (name)	County (name)	Population from 2010 Census (#)	Minimum Number of FRM/Manual Monitors Required (#)	Number of Active Monitors (#)	Number of Monitors Needed (#)	Number of Active Primary Monitors (#)
San Diego	San Diego	3.2 million	3	5	None	5

Section 9.2.2 $PM_{2.5}$ (FRM/Manual) Design Criteria for the Site of Expected Maximum Concentration

Subsection 4.7.1(1) of 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.7 "Fine Particulate Matter ($PM_{2.5}$) Design Criteria" lists the requirements needed to fulfill the $PM_{2.5}$ Design Criteria for the population oriented area of expected maximum concentration for a $PM_{2.5}$ sequential/FRM (manual) sampler. Tables 9.6a - 9.6b list this requirement.

Table 9.6a Expected Maximum Annual Concentration Site using a FRM/Manual sampler

Site of Expected Maximum Concentration for Annual NAAQS (name)	Site of Expected Maximum Concentration for Annual NAAQS AQS ID (#)
San Diego-Beardsley	06-073-1010

Table 9.6b Expected Maximum 24-Hr Concentration Site using a FRM/Manual sampler

Site of Expected Maximum Concentration for 24-Hr NAAQS (name)	Site of Expected Maximum Concentration for 24-Hr NAAQS AQS ID (#)
Escondido	06-073-1002

Section 9.2.3 $PM_{2.5}$ (FRM/Manual) Design Criteria for the Site of Expected Poor Air Quality

Subsection 4.7.1(2) of 40 CFR Part 58-"Ambient Air Quality Surveillance", Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.7 "Fine Particulate Matter ($PM_{2.5}$) Design Criteria" lists the requirements needed to fulfill the $PM_{2.5}$ Design Criteria for the location of a station in an area of poor air quality. Table 9.7 lists this requirement.

Table 9.7 Site of Poor Air Quality to Locate a FRM/Manual sampler

Site of Poor Air Quality (name)	Site of Poor Air Quality AQS ID (#)
Escondido	06-073-1002

Section 9.2.4 $PM_{2.5}$ Design Criteria for Near-road Requirements

Subsection (b)(2) of 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.7 "Fine Particulate Matter ($PM_{2.5}$) Design Criteria" lists the requirements needed to fulfill $PM_{2.5}$ Design Criteria for the NO_2 Near-road program. Table 9.8 lists these requirements.

Table 9.8 $PM_{2.5}$ Minimum Number of Near-road Monitors Required

MSA (name)	County (name)	Population from 2010 Census (#)	Minimum Number of NO_2 Near-road Monitors Required (#)	Are Collocated $PM_{2.5}$ Monitors Required (yes/no)	Minimum Number of Collocated $PM_{2.5}$ Monitors Required (#)	Total Number of $PM_{2.5}$ Monitors Required (#)	Total Number of Active $PM_{2.5}$ Monitors (#)	Total Number of $PM_{2.5}$ Monitors Needed (#)
San Diego	San Diego	3.2 million	2	Yes	1	1	0	1

Section 9.2.5 $PM_{2.5}$ Continuous Network Design Criteria

Subsection 4.7.2 of 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.7 "Fine Particulate Matter ($PM_{2.5}$) Design Criteria" lists the requirements needed to fulfill the $PM_{2.5}$ Design Criteria for the minimum number of continuous/non-FEM samplers (see Tables 9.9a-9.9b).

Table 9.9a $PM_{2.5}$ Non-FEM/Continuous Samplers Design Criteria

Minimum Number of Required FRM/Manual Samplers Required (#)	Minimum Number of Required Continuous Samplers= (½ Minimum Number of) Required FRM/Manual Samplers Rounded Up (#)	Number of Active Continuous Samplers (#)	Number of Continuous Samplers Needed (#)
3	3 x (½) = 2	6	None

Table 9.9b Design Criteria for the Minimum Number of $PM_{2.5}$ Continuous Samplers Required to be Collocated with $PM_{2.5}$ FRM/Manual Samplers

Minimum Number of Continuous Samplers (Sites) Required to be Collocated with FRM/Manual Samplers (Sites) (#)	Number of Active Sites that have Continuous Samplers Collocated with FRM/Manual Samplers (Sites) (#)	Number of Continuous Sampler Sites that must be Collocated with FRM/Manual Samplers (Sites) Needed (#)	Locations of Continuous Samplers (Sites) Collocated with FRM/Manual Samplers (Sites) (name)	Locations of Continuous Samplers (Sites) Collocated with FRM/Manual Samplers (Sites) AQS ID (#)
1	3	None	El Cajon Escondido SD-Beardsley	06-073-0003 06-073-1002 06-073-1010

Section 9.2.6 $PM_{2.5}$ Speciation Network Design Criteria

There are two requirements for the STN & CSN networks. The first is to maintain the current speciation network as designed by the governing authorities and stated in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.7 "Fine Particulate Matter ($PM_{2.5}$) Design Criteria", subsection 4.7.4.

The second requirement is that STN & CSN samplers must be sited at all NCore locations, as stated in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 3, "Design Criteria for NCore Sites", subsection (b). Table 9.10 provides a summary of these two requirements.

Table 9.10 Design Criteria for $PM_{2.5}$ STN & CSN Samplers

Number of STN Samplers (Sites) (#)	Number of CSN Samplers (Sites) (#)	Location of CSN & STN Monitors (Sites) (name)	Location of CSN & STN Monitors (Sites) AQS ID (#)	Comments
2	2	El Cajon (ECA)	06-073-0003	NCore site requirement
		Escondido (ESC)	06-073-1002	Previously existing network site

Section 9.3.0 $PM_{2.5}$ (Non-speciated) - Rating Summary

Table 9.11 is a summary of the District's $PM_{2.5}$ sampler rating for the instruments in the network after using the EPA's Network Assessment tools for $PM_{2.5}$. For $PM_{2.5}$, the EPA Network Assessment Tools used samplers with parameter codes that equated to either an FRM or non-FEM $PM_{2.5}$ sampler for 2010-2014. $PM_{2.5}$ FRM samplers are manually loaded with a filter and run once every three days (1:3), and the filters are analyzed back at the laboratory; this process takes approximately 2-4 weeks. The $PM_{2.5}$ non-FEM samplers are near-real time reporting instrumentation. This technology has proven unreliable to be used for regulatory purposes. Currently, all FEM $PM_{2.5}$ samplers have been converted to non-FEM status, signifying that the data from the $PM_{2.5}$ non-FEM samplers are for public information and trends analysis uses only.

How does this change impact the Network Assessment? Only FRM samplers will be evaluated with the Network Assessment tools. In addition, all non-FEM $PM_{2.5}$ samplers will receive zero ratings for regulatory need. Because the non-FEM samplers now are designated for public information purposes, they will receive higher ratings for public information/health awareness need. For example, the Downtown sampler is in an industrial area, and thereby the need for near-real time data there is higher than the need for a near-real time sampler at Del Mar.

Table 9.11 $PM_{2.5}$ Monitor Summary Rating

	Overall Scoring	**COMMENTS**	**1.** Correlation	**2.** Removal	**3.** Area Served	**4.** Threshold	**5.** Internal
Alpine (ALP)	**49**	**1&2:** No correlation & high bias if removed **3:** Based on total population and population growth **4:** Low threshold	8	7	2	6	26
Camp Pendleton (CMP)	**61**	**1&2:** No correlation & high bias if removed **3:** Based on total population and surrounding population **4:** High threshold	8	7	10	9	27
Chula Vista (CVA)	**75**	**1&2:** Marginal correlation; bias if removed **3:** Based on total population and population growth **4:** High threshold	7	9	8	8	43
El Cajon (ECA)	**86**	**1&2:** No correlation & high bias if removed **3:** Based on total population and surrounding population **4:** Low Threshold	8	10	7	7	54
Escondido (ESC)	**73**	**1&2:** No correlation & high bias if removed **3:** Based on total population and surrounding population **4:** Low threshold	7	8	8	7	43
San Diego-Beardsley (DTN)	**86**	**1&2:** Marginal correlation; bias if removed **3:** Based on total population and surrounding population **4:** High threshold	7	10	10	9	50
San Diego-Kearny Villa Rd. (KVR)	**49**	**1&2:** No correlation & high bias if removed **3:** Based on total population and surrounding population **4:** moderate threshold	6	5	6	6	26
2nd Near-road (Barrio)	**37**	**1:** n/a **2:** Heavy Industrial/mixed use **3:** Highest PM site **4:** EJ area **5:** Public need	3	10	0	10	10
San Ysidro (SAY)	**31**	**1:** n/a **2:** Border crossing **3:** High PM site **4:** EPA request **5:** Public need	3	8	0	10	10
Otay Mesa-Donovan (DVN)	**28**	**1:** n/a **2:** Bedroom **3:** n/a **4:** EPA request **5:** Compare to SAY	6	6	0	7	9

Section 9.3.1 $PM_{2.5}$ (Non-speciated) - Correlation Matrix

The correlation matrix analysis shows the correlation, relative difference, and distance between sites. The shape of the ellipses represents the Pearson Squared Correlation between sites with a circle representing zero correlation and a straight line representing perfect correlation; the correlation between the sites represents the degree of relatedness. The correlation, however, does not indicate if one site measures concentrations substantially higher or lower than another; for this, the color of the ellipses represents the average relative difference. This analysis aids in determining sites that are redundant.

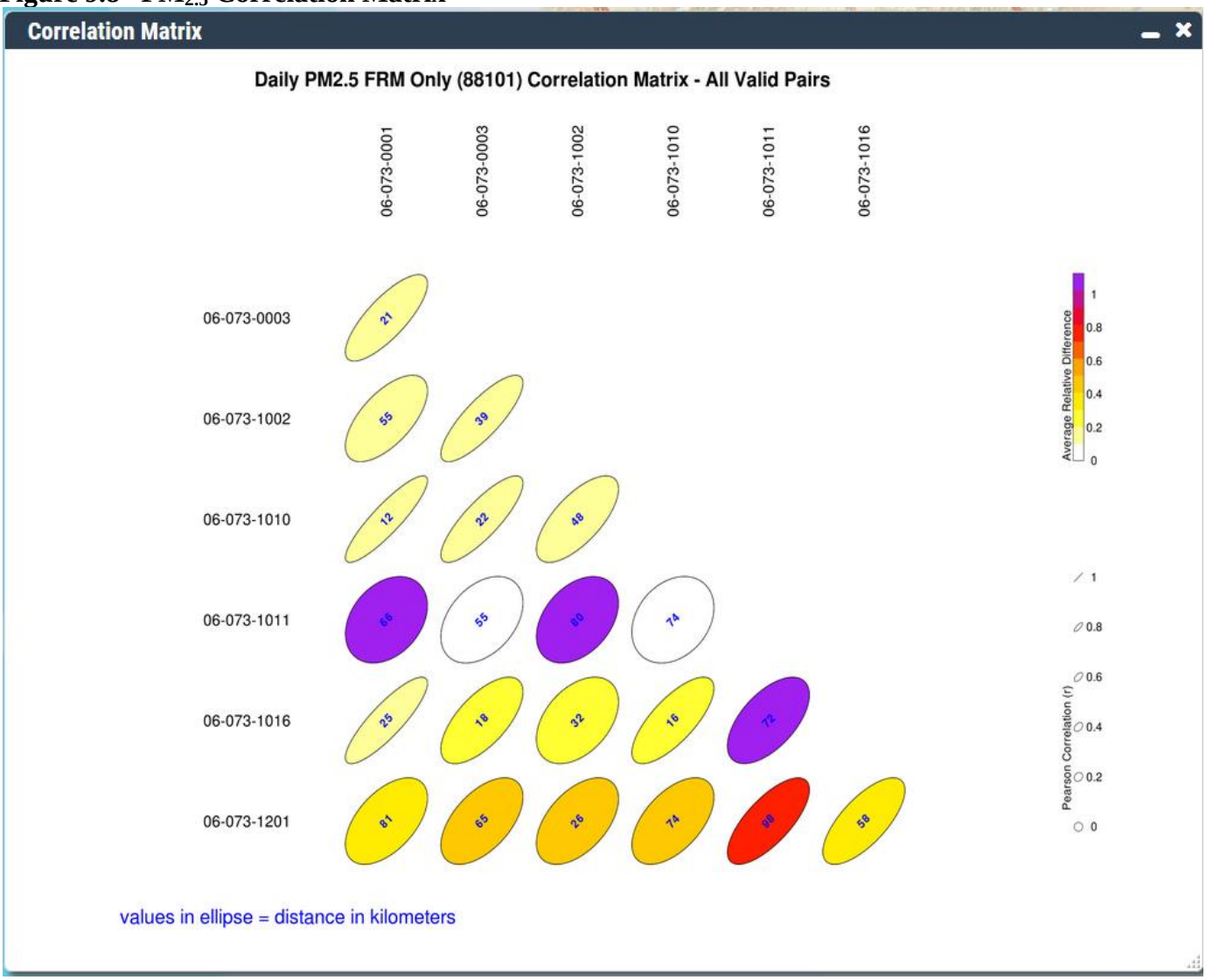
The $PM_{2.5}$ correlation between FRM sites in San Diego County is shown in Figure 9.8. The site pairs that result in correlations greater than 0.8 and relative differences less than 0.3 for $PM_{2.5}$ include the following:

1. 06-073-1010 Downtown (DTN) with 06-073-0001 Chula Vista (CVA) has marginal correlation.

This marginal correlation between DTN and CVA is not unexpected. CVA is approximately six miles downwind of the DTN station, and often other instruments correlate with DTN as well. The need for public reporting in highly populated communities requires that the District not decommission either $PM_{2.5}$ sampler. Both sites have the highest rates of respiratory ailments in the County. Additionally, the DTN sampler is designated as the highest concentration site and is in an EJ area. The Chula Vista site is the location of our QA sampler. There is no room on the decks of the other FRM locations to accommodate an additional FRM sampler, if we were to relocate these samplers.

This $PM_{2.5}$ sampler pair has correlation, small average difference, and close proximity, but no action will be undertaken for the reasons mentioned in the previous paragraph.

Figure 9.8 $PM_{2.5}$ Correlation Matrix



Legend:
06-073-0003 El Cajon (ECA)
06-073-1002 Escondido (ESC)
06-073-1010 Downtown (DTN)
06-073-1011 Blvd (not a San Diego APCD air monitoring site)
06-073-1016 Kearny Villa Road (KVR)
06-073-1201 Pala (not a San Diego APCD air monitoring site)
06-073-0001 Chula Vista (CVA)

Section 9.3.2 $PM_{2.5}$ (Non-Speciated) - Removal Bias

This section aims to determine redundant sites. The bias estimation uses the nearest neighbor site to estimate the concentration at that location if the site was not there. A positive bias indicates that if the site being examined was removed, the neighboring site(s) would register higher values. The opposite indicates a negative bias. Figure 9.9 is a pictorial representation of the $PM_{2.5}$ samplers in the network. The darker blue the circle, the more negative the bias; the darker red the circle, the more positive the bias; white is neutral. For Removal Bias, the Network Assessment tool takes into account both FRM and FEM $PM_{2.5}$ samplers.

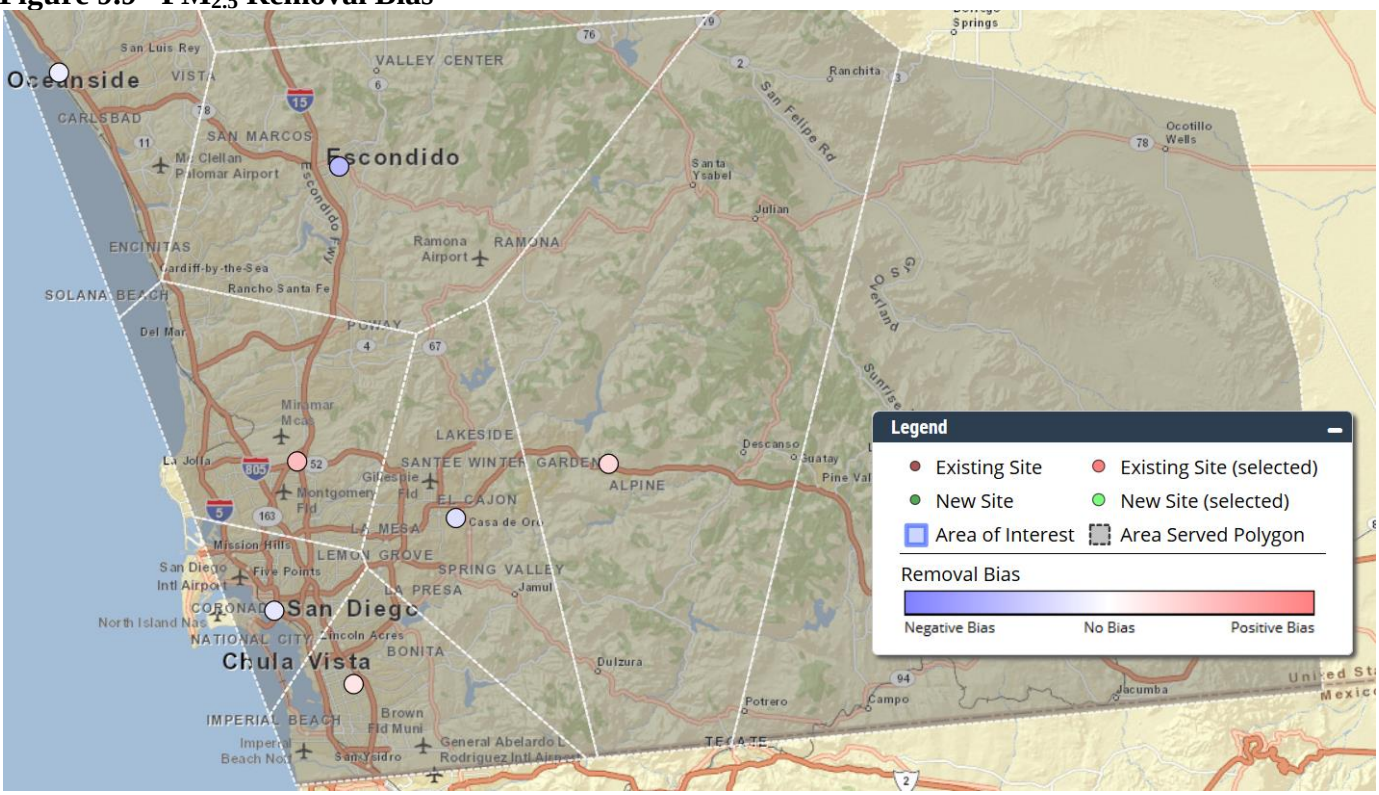
The Removal Bias between sites in San Diego County for $PM_{2.5}$ indicates the following sites:

1. Camp Pendleton
2. Chula Vista

The removal of the Camp Pendleton $PM_{2.5}$ sampler would leave two large gaps in the network. The $PM_{2.5}$ samplers at Camp Pendleton and Escondido are at opposite ends of SR 78, which connects the only north-south interstate highways in the SDAB. Additionally, both ends of SR78 are in the 10 most trafficked areas in the County. The data from the ESC and CMP stations are used to interpolate what the concentrations would be for the cities/communities between the stations. Furthermore, the next $PM_{2.5}$ sampler is 40 miles to the south at the Downtown station. The removal of the CMP $PM_{2.5}$ sampler would create an approximate 600 sq. mi. gap in the network. Lastly, this site is used to register transport from the South Coast air basin. The Camp Pendleton site is needed for many purposes.

The removal of the Chula Vista $PM_{2.5}$ sampler is not logistically feasible at this time. EPA has requested that the District relocate the quality assurance $PM_{2.5}$ sampler to a higher concentration area. The only higher concentration site that his room to accommodate an additional sampler is Chula Vista. Also, this sampler is part of the California $PM_{2.5}$ FRM network and will require ARB and EPA approval. Furthermore, some of the highest rates of respiratory ailments are in this part of the County. For this reason, the residents of Chula Vista have requested that a $PM_{2.5}$ (FEM) continuous sampler be added to this station. Once all the station relocations have been completed, the relocation of the $PM_{2.5}$ FEM sampler (with the possible substitution of $PM_{2.5}$ (FEM) continuous sampler) will be revisited.

Figure 9.9 $PM_{2.5}$ Removal Bias



Legend:

06-073-0003 El Cajon (ECA)
06-073-1002 Escondido (ESC)
06-073-1006 Alpine (ALP)
06-073-1008 Camp Pendleton (CMP)
06-073-1010 Downtown (DTN)
06-073-1011 Blvd (not a San Diego APCD air monitoring site)
06-073-1016 Kearny Villa Road (KVR)
06-073-1201 Pala (not a San Diego APCD air monitoring site)
06-073-0001 Chula Vista (CVA)

Section 9.3.3 $PM_{2.5}$ (Non-speciated) - Area Served

The regions and area served by the monitors represent significant population conglomerations. Figure 9.10 is a pictorial representation of the area served by the $PM_{2.5}$ samplers in the air quality network. The elimination of any station will correspond to a decrease in coverage and a decrease in the District's ability to warn and inform the public of any health concerns.

The area east of Camp Pendleton and west of Escondido includes the communities of San Marcos and Vista. This area is one of the faster growing areas in the county. The ozone, nitrogen dioxide, and $PM_{2.5}$ concentrations have been shown to be derived from the measured concentrations from the ozone, nitrogen dioxide, and $PM_{2.5}$ monitors at the Camp Pendleton and Escondido stations.

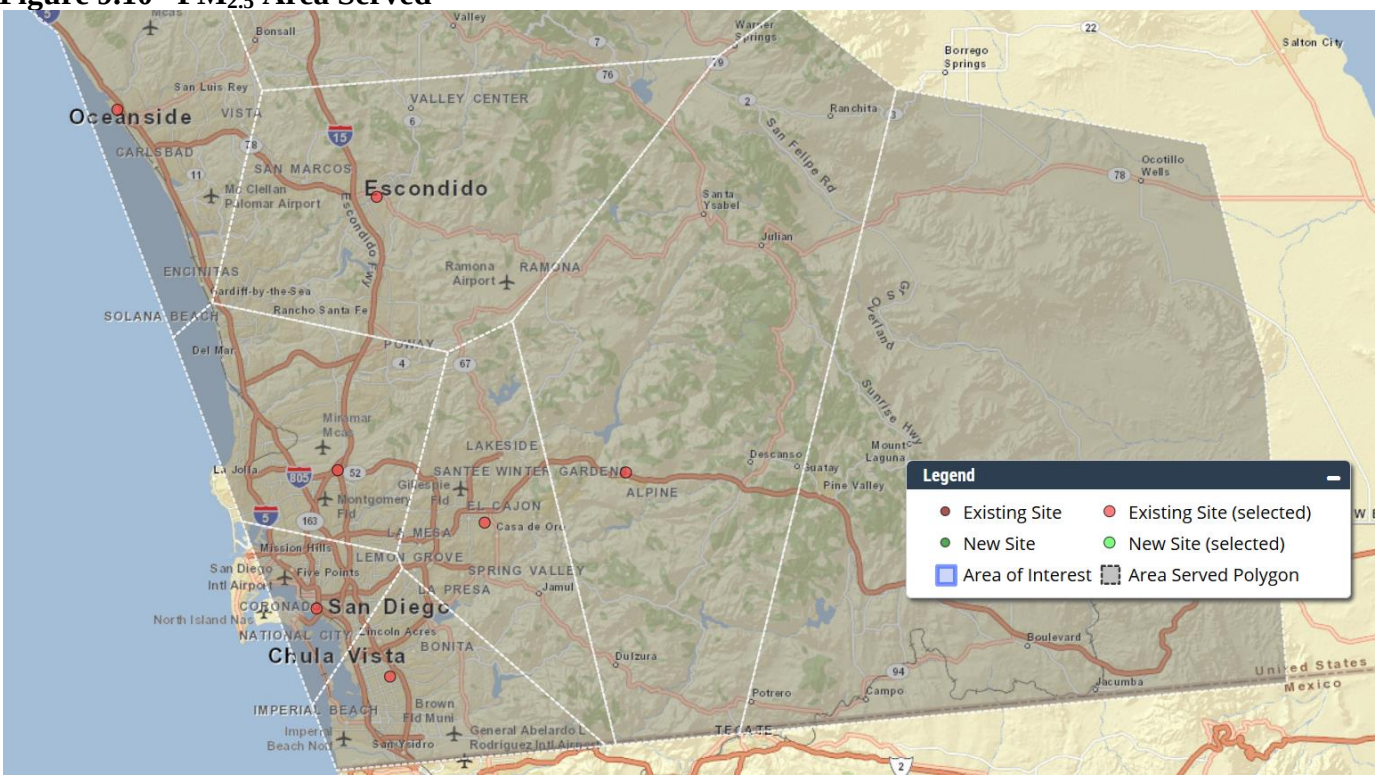
The area north of Escondido includes the communities of Bonsall and Fallbrook. This area has expanded, and its population has grown significantly over the years. The SCAQMD has monitors for ozone, nitrogen dioxide, PM_{10} and $PM_{2.5}$ in the Temecula Valley (the area north of Fallbrook), Elsinore, Norco/Corona, and Perris Valley. The ozone, nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations for the Bonsall and Fallbrook general areas can be derived from the Escondido and Temecula ozone, nitrogen dioxide, PM_{10} and $PM_{2.5}$ monitors.

The areas east of the Alpine station have low population centers, low traffic count, and similar topography; thereby, an additional $PM_{2.5}$ monitor in this area would add little informational value.

The areas east of the Escondido station have low population centers, low traffic count, and similar topography; thereby, an additional $PM_{2.5}$ monitor in this area would add little informational value.

The area north of the Otay Mesa - Donovan station is one of the faster growing areas in the county. Some temporary monitoring may be undertaken between Otay Mesa and El Cajon, if modeling triggers a need to establish a presence.

Figure 9.10 $PM_{2.5}$ Area Served



Legend:

06-073-0003 El Cajon (ECA)
06-073-1002 Escondido (ESC)
06-073-1006 Alpine (ALP)
06-073-1008 Camp Pendleton (CMP)
06-073-1010 Downtown (DTN)
06-073-1011 Blvd (not a San Diego APCD air monitoring site)
06-073-1016 Kearny Villa Road (KVR)
06-073-1201 Pala (not a San Diego APCD air monitoring site)
06-073-0001 Chula Vista (CVA)

Section 9.3.4 $PM_{2.5}$ (Non-speciated) - Surface Probability

Surface probability maps provide information on the spatial distribution of the highest value for a pollutant. They illustrate the probability that exceedances may occur in certain geographical locations. These maps should not be used alone to justify a new monitor/air monitoring station location. Other materials should be used, such as demographics, area served, budgetary constraints, logistics, and other such concerns.

Figures 9.11a and 9.11b are pictorial representations of the areas with high need for coverage, based on the current NAAAQS (red being the highest need and green being the lowest) with the ambient air monitoring stations indicated by circles.

The need for coverage is 5%-45%, based on the current NAAQS with the higher percentage need located in the areas along Interstate 5 and in the City of San Diego.

Figure 9.11a $PM_{2.5}$ Need for Coverage Based on the Current NAAQS

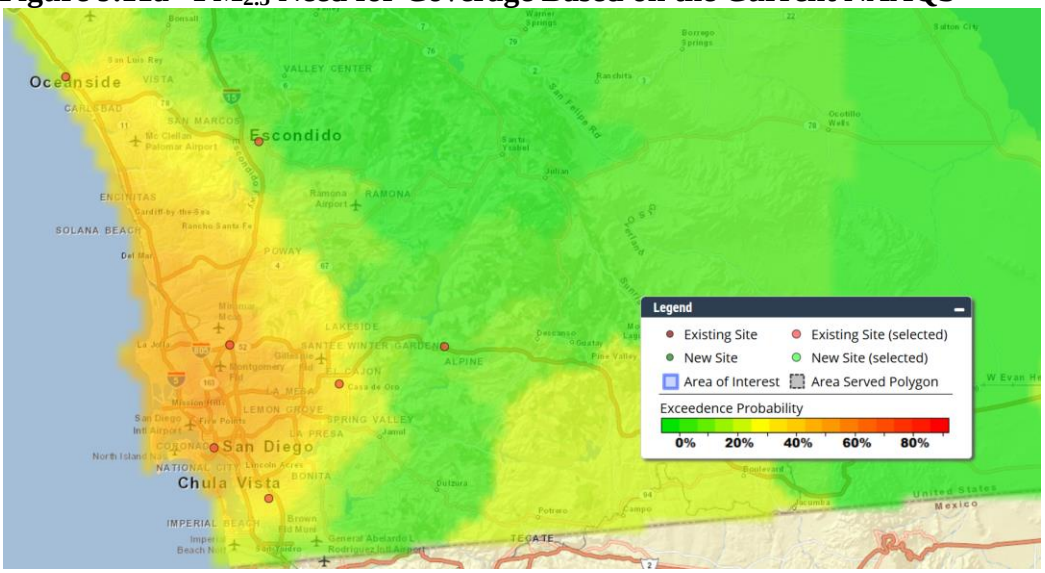
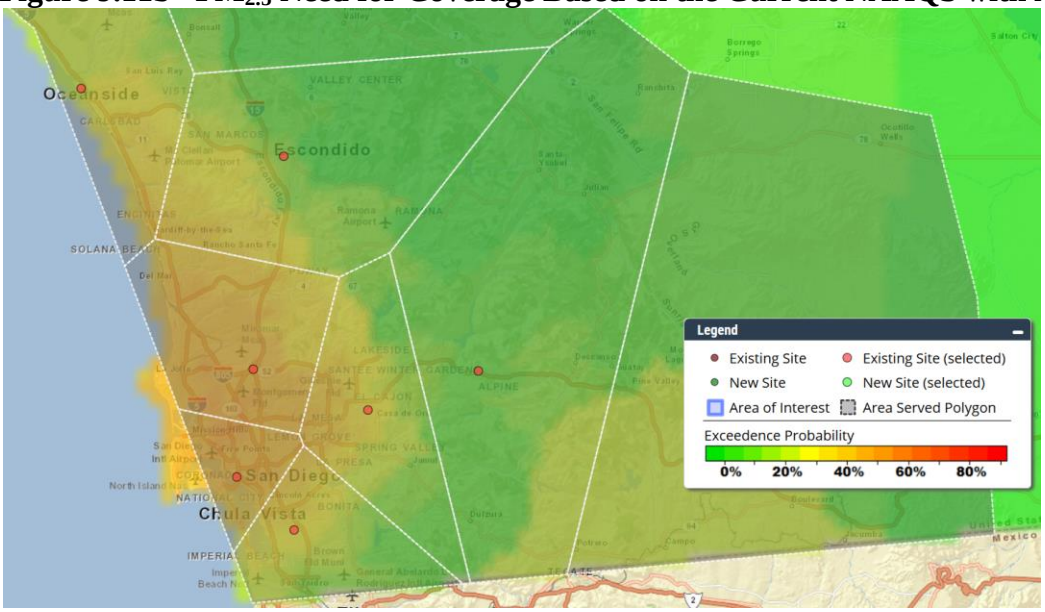


Figure 9.11b $PM_{2.5}$ Need for Coverage Based on the Current NAAQS with Area Served Overlay



Section 9.3.5 $PM_{2.5}$ (Non-speciated) - Rating Summary using District Tools

Table 9.12 is a summary of the District's $PM_{2.5}$ sampler rating for the instruments in the network after using the District's internal measuring tools.

Table 9.12 $PM_{2.5}$ Sampler Summary Rating using District Criteria

	Overall Scoring	COMMENTS	1. Total Monitors	2. Community Type	3. Regulatory Needs	4. non-Regulatory	5. Other
Alpine (ALP)	**26**	**1:** n/a **2:** Rural/bedroom **3:** n/a **4:** Needed for east County **5:** Trends; recently moved	4	4	0	8	10
Camp Pendleton (CMP)	**27**	**1:** n/a **2:** Bedroom **3:** n/a **4:** Only north coastal sampler **5:** Trends	5	6	0	8	8
Chula Vista (CVA)	**43**	**1:** n/a **2:** Mixed use **3:** Collocation site **4:** Highest asthma rates **5:** Deck upgrade	7	7	9	10	10
El Cajon (ECA)	**54**	**1:** n/a **2:** Light Industrial/mixed use **3:** Required for NCore **4:** Required for NCore **5:** Recently moved	17	7	10	10	10
Escondido (ESC)	**43**	**1:** n/a **2:** Light Industrial/mixed use **3:** High PM site **4:** Borderline EJ area **4:** Needed for adjacent communities	9	9	8	8	9
San Diego-Beardsley (DTN)	**50**	**1:** n/a **2:** Heavy Industrial/mixed use **3:** Highest PM site **4:** EJ area **5:** Public need	10	10	10	10	10
San Diego-Kearny Villa Rd. (KVR)	**26**	**1:** n/a **2:** Mixed use **3:** Cleanest site **4:** n/a **4:** Recently moved	4	5	7	0	10
2nd Near-road (Barrio)	**37**	**1:** n/a **2:** Heavy Industrial/mixed use **3:** Highest PM site **4:** EJ area **5:** Public need	3	10	0	10	10
San Ysidro (SAY)	**31**	**1:** n/a **2:** Border crossing **3:** High PM site **4:** EPA request **5:** Public need	3	8	0	10	10
Rancho Carmel Dr (RCD)	**34**	**1:** n/a **2:** Bedroom **3:** Near-road **4:** EPA request **5:** Compare to ESC	3	6	10	8	7
Otay Mesa-Donovan (DVN)	**28**	**1:** n/a **2:** Bedroom **3:** n/a **4:** EPA request **5:** Compare to SAY	6	6	0	7	9

Section 9.4.0 $PM_{2.5}$ (Speciated) - Rating Summary

The $PM_{2.5}$ speciation samplers are part of the EPA STN and CSN programs. They are located in El Cajon and Escondido. The Network Assessment tools were run for both sites, and the results are below:

1. Correlation
   There is no correlation between the two sites. This result is expected, because they are two distinct communities with completely different topography, influences, and purposes.
2. Removal Bias
   Because there are only two sites and there is no correlation, there is maximum bias if one is removed from the network.

The District has no control if a sampler should be decommissioned or not, but it is the District's recommendation to increase CSN sampling in the air basin. The District has two Ports-of-Entry (POE) with Mexico at San Ysidro and Otay Mesa (and a third POE is to be built east of Otay Mesa). The Otay Mesa border crossing is the busiest truck crossing in California and one of the busiest in the nation. This site should be expanded to include CSN monitoring for black carbon. The San Ysidro border crossing is the busiest POE in the world for cars and pedestrians. This location should be considered as a comparison study between two POEs designed for different purposes.

The Downtown station is located in a community zoned for mixed use. This station captures emissions from several sources: Interstates 5, 805, 15 and State Route 94, downtown San Diego, Lindbergh Field, North Island Naval Air Station, marine terminals, NASSCO shipyards, Continental Maritime shipyard, Southwest Marine, train yards, and harbor ship traffic. The area has significant heavy equipment use, operated by diesel engines. This site offers a unique challenge and should be included in the CSN program.

Table 9.13 is a summary of the ratings for the existing stations and synopses of the three projected stations.

Table 9.13 $PM_{2.5}$ (Speciated) Monitor Summary Rating using District Criteria

	Overall Scoring	**COMMENTS**	**1.** Correlation	**2.** Removal	**3.** Area Served	**4.** Threshold	**5.** Total Monitors	**6.** Community Type	**7.** Other
El Cajon (ECA)	**66**	**1&2:** No Correlation; extreme bias if removed **3:** Based on total population and surrounding population **4:** Moderate threshold **5:** n/a **6:** Mixed use **7:** Microcosm of East County; receptor site	10	10	7	7	17	7	8
Escondido (ESC)	**60**	**1&2:** No Correlation; extreme bias if removed **3:** Based on total population and surrounding population **4:** Low threshold **5:** n/a **6:** **7:** Microcosm of Northeast County; receptor site	10	10	8	5	9	9	9
San Diego-Beardsley (DTN)	**30**	**1-5:** n/a **6:** Heavy industry mixed with residences **7:** Environmental Justice area	n/a	n/a	n/a	n/a	10	10	10
Otay Mesa-Donovan (DVN)	**23**	**1-5:** n/a **6:** Mostly business; residences slowly moving in upwind **7:** One of the busiest heavy duty truck crossings in the nation	n/a	n/a	n/a	n/a	6	7	10
San Ysidro (SAY)	**16**	**1-5:** n/a **6:** Mixed used **7:** Busiest port of entry in the world; no permanent air monitoring station sited	n/a	n/a	n/a	n/a	n/a	7	9

Chapter 10 Particulate Matter 10 µm (PM_{10})

Section 10.0.0 PM_{10} Introduction

PM_{10} was sampled at six locations throughout the SDAB (Figure 10.1). There is a PM_{10} (Lo-Vol) sampler at the El Cajon location that is also part of the paired lo-vol samplers needed to calculate PMcoarse. Please note:

- The Otay Mesa (OTM) station was permanently relocated to the Donovan State Prison area; this station is called Donovan (DVN).
- The El Cajon station was temporarily relocated to the Gillespie Field area off of Floyd Smith Drive; this station is called Floyd Smith Drive (FSD).
- The Kearny Mesa-Overland (KMA) station relocated to Kearny Villa Rd (KVR).

Figure 10.1 PM_{10} Overall Maps

The reported concentrations reflect a mix of the two station moves listed above. Because the Donovan relocation is permanent, the maps and table parameters reflect the new site metadata (labeled as DVN). Because the Floyd Smith Drive relocation is temporary, the maps and table parameters reflect the permanent site metadata (labeled as ECA).

Section 10.1.0 PM_{10} Trends in the SDAB

PM_{10} concentrations do not correlate well to growth in population or vehicle usage, and high PM_{10} concentrations do not always occur in high population areas. Emissions from stationary sources and motor vehicles form secondary particles that contribute to PM_{10} in many areas. Over this period, the three-year average of the annual average shows a large decrease; however, there is a great deal of variability from year-to-year. Much of this variability is due to the meteorological conditions rather than changes in emissions.

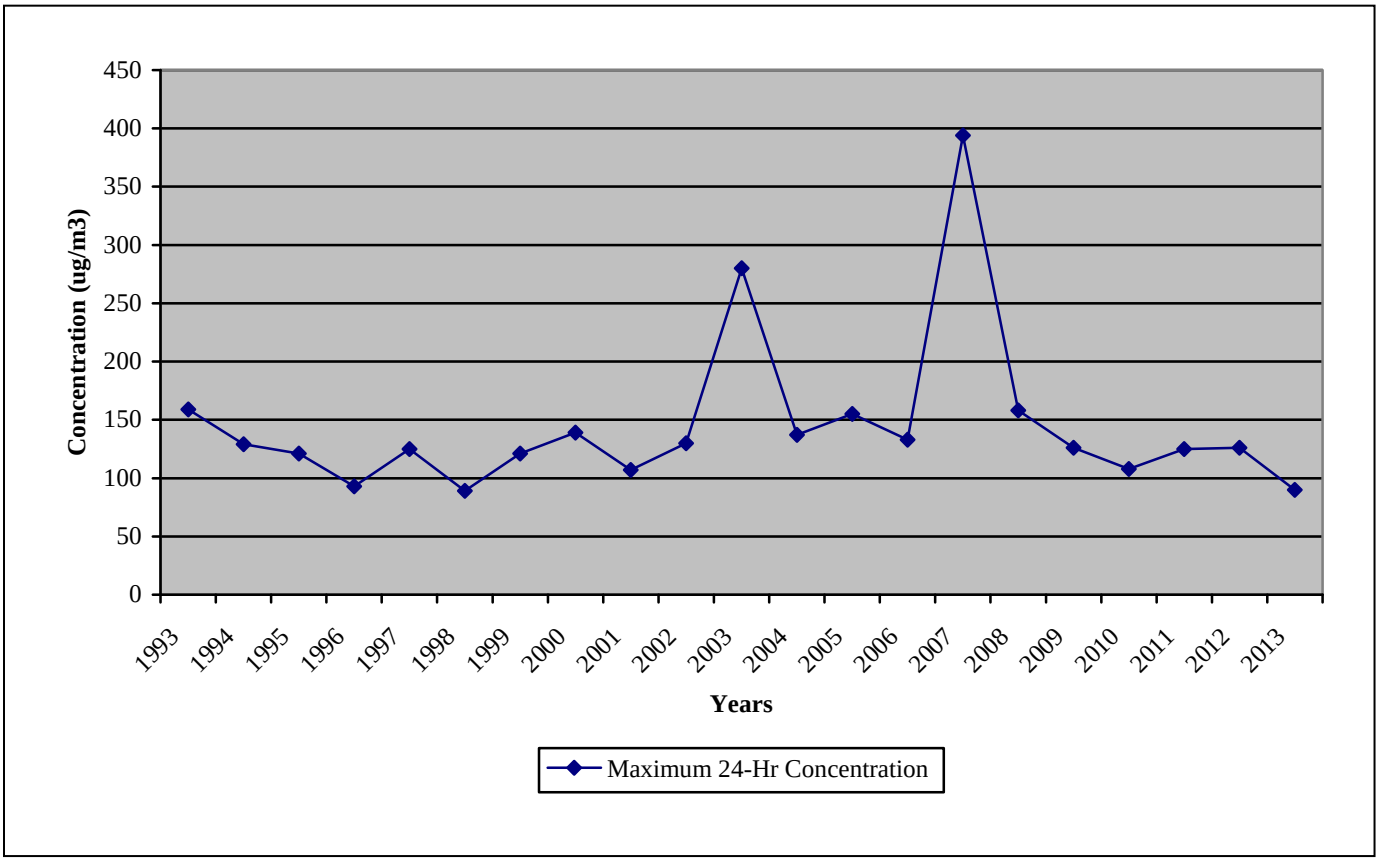
Due to the firestorms of 2003 and 2007, the annual averages exceeded the National 24-Hr standard for those years. The firestorms are considered exceptional events, and they do not have a lasting impact in the SDAB. Exceptional events are tallied in the accounting for attainment/non-attainment status. Even with the last two firestorms, the County still qualifies for attainment status.

There is a substantial amount of variability from year-to-year in the 24-Hr statistics. This variability is a reflection of the meteorology, sporadic nature of events such as wildfires, and changes in monitoring locations. Note that the "Days above the National 24-Hr Standard" row in Table 10.1 and Figure 10.2 reflect the PM_{10} standard for that year.

Table 10.1 PM_{10} Summary of Concentrations for the Last 20 Years

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Maximum 24-Hr Concentration (µg/m³)	129	121	93	125	89	121	139	107	130	280	137	155	133	394	158	126	108	125	126	90	59
Days above the National Standard (#)	0	0	0	0	0	0	0	0	0	2	0	2	0	2	1	0	0	0	0	0	0

Figure 10.2 PM_{10} Concentrations, 1994-2014



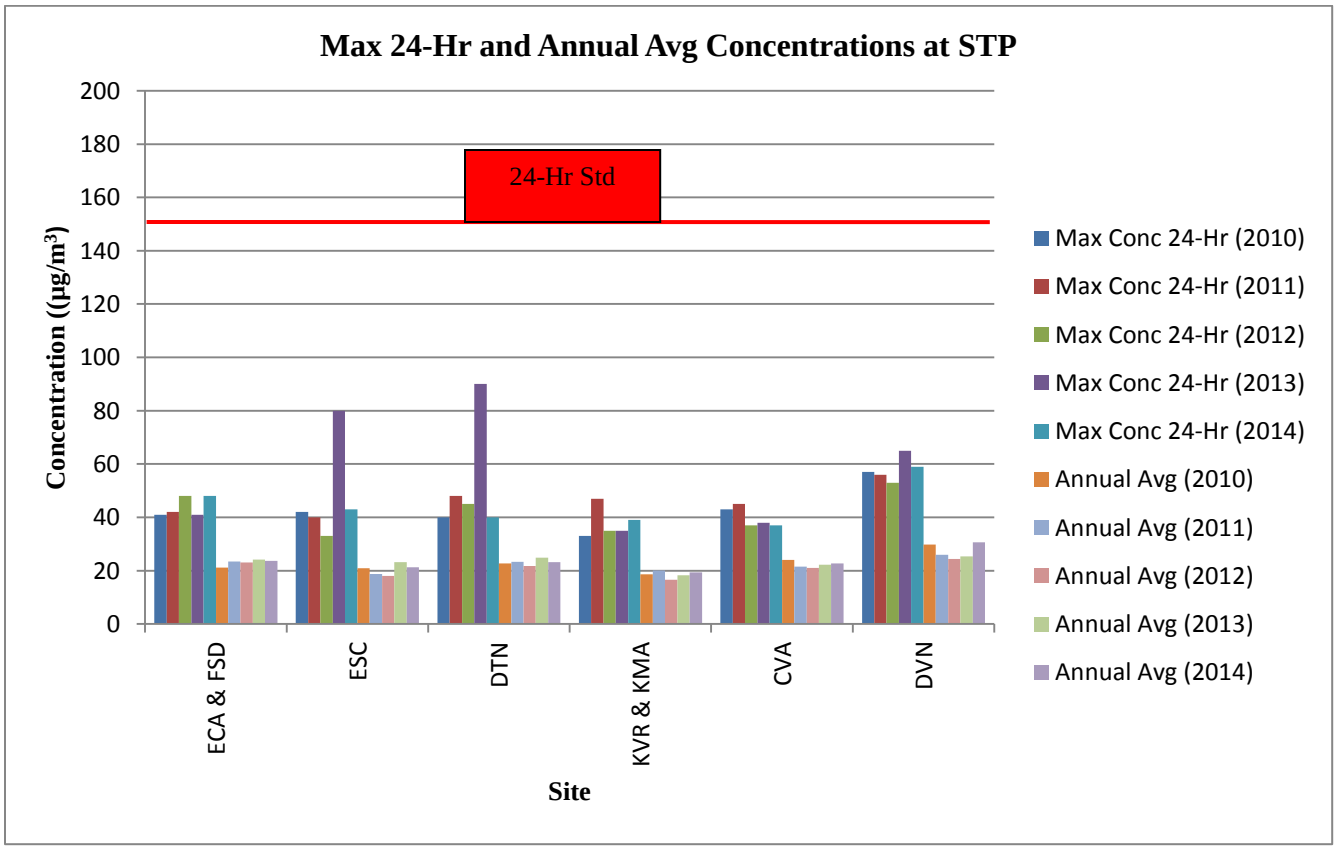
Section 10.1.1 PM_{10} Measurements at STD Conditions by Site, 2010-2014

All data from the PM_{10} samplers are reported in standard (STD) conditions, as shown in Table 10.2a. Figure 10.3 shows these graphically. Please note: Data from the now closed Otay Mesa station/sampler is excluded, because it was classified as microscale.

Table 10.2a PM_{10} Measurements at STD Conditions by Site, 2010-2014

Site (name)		Maximum Concentration for 24-Hr (STD) (µg/m³)					Annual Average (STD) (µg/m³)				
		2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
El Cajon	ECA & FSD	41	42	48	41	48	21.2	23.5	23.1	24.2	23.7
Escondido	ESC	42	40	33	80	43	20.9	18.8	18.1	23.2	21.3
San Diego-Beardsley	DTN	40	48	45	90	40	22.7	23.3	21.8	24.9	23.2
Kearny Villa Rd	KVR & KMA	33	47	35	35	39	18.6	20.1	16.6	18.3	19.4
Chula Vista	CVA	43	45	37	38	37	24.0	21.5	21.0	22.2	22.7
Donovan	DVN	57	56	53	65	59	29.8	26.0	24.4	25.4	30.7

Figure 10.3 PM_{10} Measurements at STD Conditions by Site, 2010-2014



Section 10.1.2 PM_{10} Measurements at Local Conditions by Site

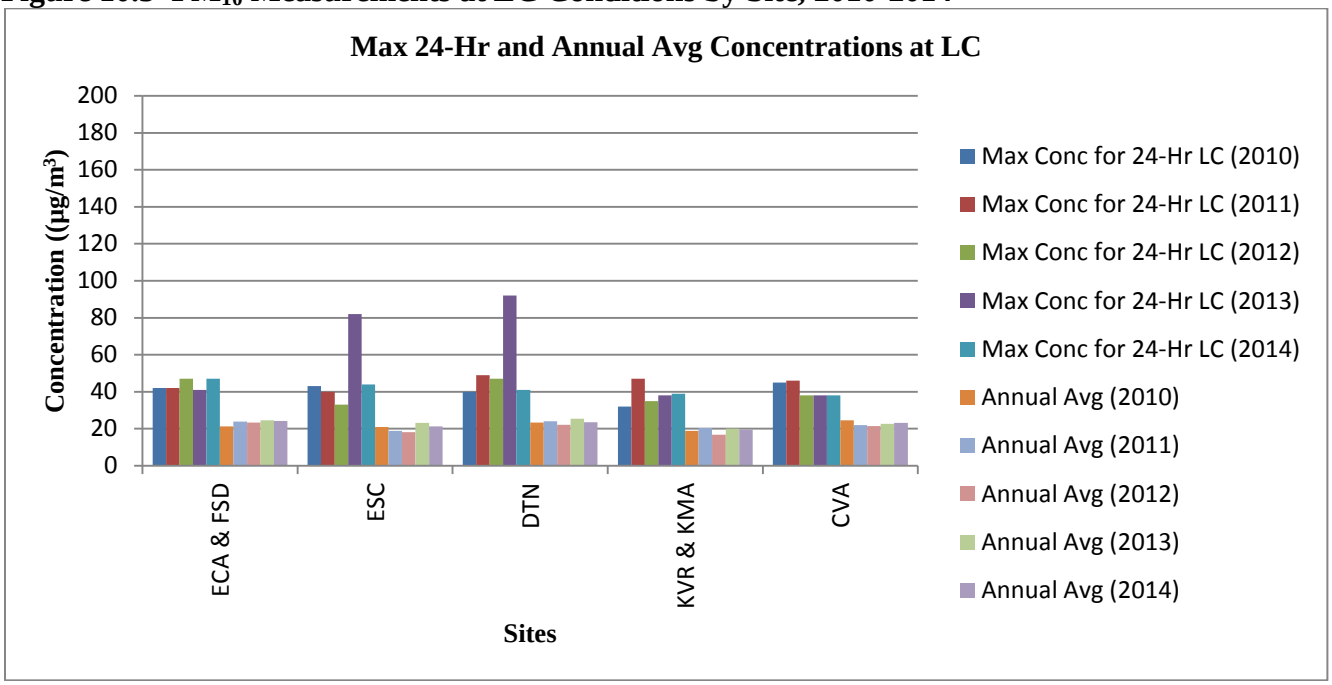
Table 10.2b lists the data in LC. Note the NAAQS is written for STD conditions; therefore, the concentrations calculated to LC conditions are not comparable to the NAAQS. Figure 10.4 shows these graphically. Please note: Data from the now closed Otay Mesa station/sampler is excluded, because it was classified as microscale.

Table 10.2b PM_{10} Measurements at Local Conditions by Site, 2010-2014

Site (name)		Maximum Concentration for 24-Hr (LC) (µg/m^3)					Annual Average (LC) (µg/m^3)				
		2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
El Cajon	ECA & FSD	42	42	47	41	47	21.3	23.8	23.4	24.5	24.2
Escondido	ESC	43	40	33	82	44	21.0	18.9	18.1	23.2	21.3
San Diego-Beardsley	DTN	40	49	47	92	41	23.4	24.0	22.2	25.5	23.6
Kearny Villa Rd	KVR & KMA	32	47	35	38	39	18.8	20.4	16.7	20.0	19.5
Chula Vista	CVA	45	46	38	38	38	24.6	22.0	21.5	22.6	23.1
Donovan	DVN	*	*	*	*	*	*	*	*	*	*

*The sampler at DVN was a standalone instrument and only measured in STP; therefore, there is no data for LC concentrations. Upon expansion of the DVN location to a full station and the added infrastructure, the sampler was able to collect data in LC.

Figure 10.3 PM_{10} Measurements at LC Conditions by Site, 2010-2014



Section 10.2.0 PM_{10} Federal Design Criteria

The Federal requirements for the number of monitors for PM_{10} are described in the 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.6 "Particulate Matter (PM_{10}) Design Criteria".

Section 10.2.1 PM_{10} Design Criteria

Subsection 4.6 in 40 CFR Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 4, "Pollutant-Specific Design Criteria for SLAMS Sites", part 4.6 "Particulate Matter (PM_{10}) Design Criteria" lists the requirements needed to fulfill the PM_{10} Design Criteria for sequential samplers, from *Table D-4*. Tables 10.3a-10.3c list these requirements.

Table 10.3a Daily (24-Hr) Design Value, 2014

High Concentration Is the 24-Hr Design Value ≥ 120% of the NAAQS? (yes/no)	Medium Concentration Is the 24-Hr Design Value > 80% of the NAAQS? (yes/no)	Low Concentration Is the 24-Hr Design Value < 80% of the NAAQS? (yes/no)	Does the 24-Hr Design Value meet the NAAQS? (yes/no)
No	No	Yes	Yes

Table 10.3b PM_{10} Design Criteria for the Minimum Number of Samplers Required

MSA (name)	County (name)	2014 Population from 2010 Census (#)	Minimum Number of Sequential Samplers Required (#)	Number of Active Sequential Samplers (#)	Number of Sequential Samplers Needed (#)
San Diego	San Diego	3.2 million	2 – 4 (Low Concentration)	6*	None

*The El Cajon (ECA) sampler is a Lo-Vol.

Table 10.3c PM_{10} Site of Expected Maximum Concentration

Site of Expected Maximum Concentration (name)	Site of Expected Maximum Concentration AQS ID (#)
Donovan	06-073-1014

Section 10.3.0 PM_{10} Sampler and Station Summary

The EPA does not have Network Assessment tools available for PM_{10} samplers and station comparison. The District used other means to ascertain the viability of the PM_{10} samplers. Table 10.4 is a summary of the multilayered approach for evaluating PM_{10} samplers and stations.

Table 10.4 PM_{10} Samplers Summary Rating

	Overall Scoring	**COMMENTS**	**1.**Total Monitors	**2.** Community Type	**3.**QA/QC Needs	**4.**Other
Chula Vista (CVA)	**34**	**1:** n/a **2:** Mixed use **3:** PM_{10} collocation site; has sequential $PM_{2.5}$ **4:** High asthma; deck upgrade	7	7	10	10
Otay Mesa-Donovan (DVN)	**33**	**1:** n/a **2:** Industrial becoming mixed use **3:** Expected maximum concentration site; has collocated continuous $PM_{2.5}$ **4:** Border crossing; recently moved	6	7	10	10
El Cajon (ECA)	**44**	**1:** n/a **2:** Light Industrial/mixed use **3:** Required for PMcoarse **4:** Recently moved	17	7	10	10
Escondido (ESC)	**32**	**1**: n/a **2:** Light Industrial/mixed use **3:** Has collocated continuous & sequential $PM_{2.5}$ **4:** In a borderline EJ area	9	9	6	8
San Diego-Beardsley (DTN)	**26**	**1:** n/a **2:** Heavy Industrial/mixed use **3:** Has collocated continuous & sequential $PM_{2.5}$ **4:** EJ site; Heavy Industrial; a high concentration site	10	10	6	10
Kearny Villa Rd. (KVR)	**24**	**1:** n/a **2:** Mixed use **3:** Has collocated sequential $PM_{2.5}$ **4:** Recently moved; a high concentration site	4	5	6	9

Section 10.3.1 PM_{10} Sampler and Station Evaluation Explanation

The District is required to operate 2-6 PM_{10} samplers. The District is required to operate the PM_{10} (Lo-Vol) sampler at the NCore station in El Cajon and the PM_{10} sampler at Donovan, because it represents the site of expected maximum concentration.

Below is a recommendation for the PM_{10} network:

1. KVR has a low ranking; investigate for decommissioning.
2. DTN has a low ranking; investigate for decommissioning.
3. ESC routinely has a high maximum concentration; therefore, the sampler should not be decommissioned.
4. CVA has a history of both a low annual average and low maximum concentration. This location is also the QA-collocation site. The primary sampler should be investigated for decommissioning, and the collocated sampler would then be relocated elsewhere.

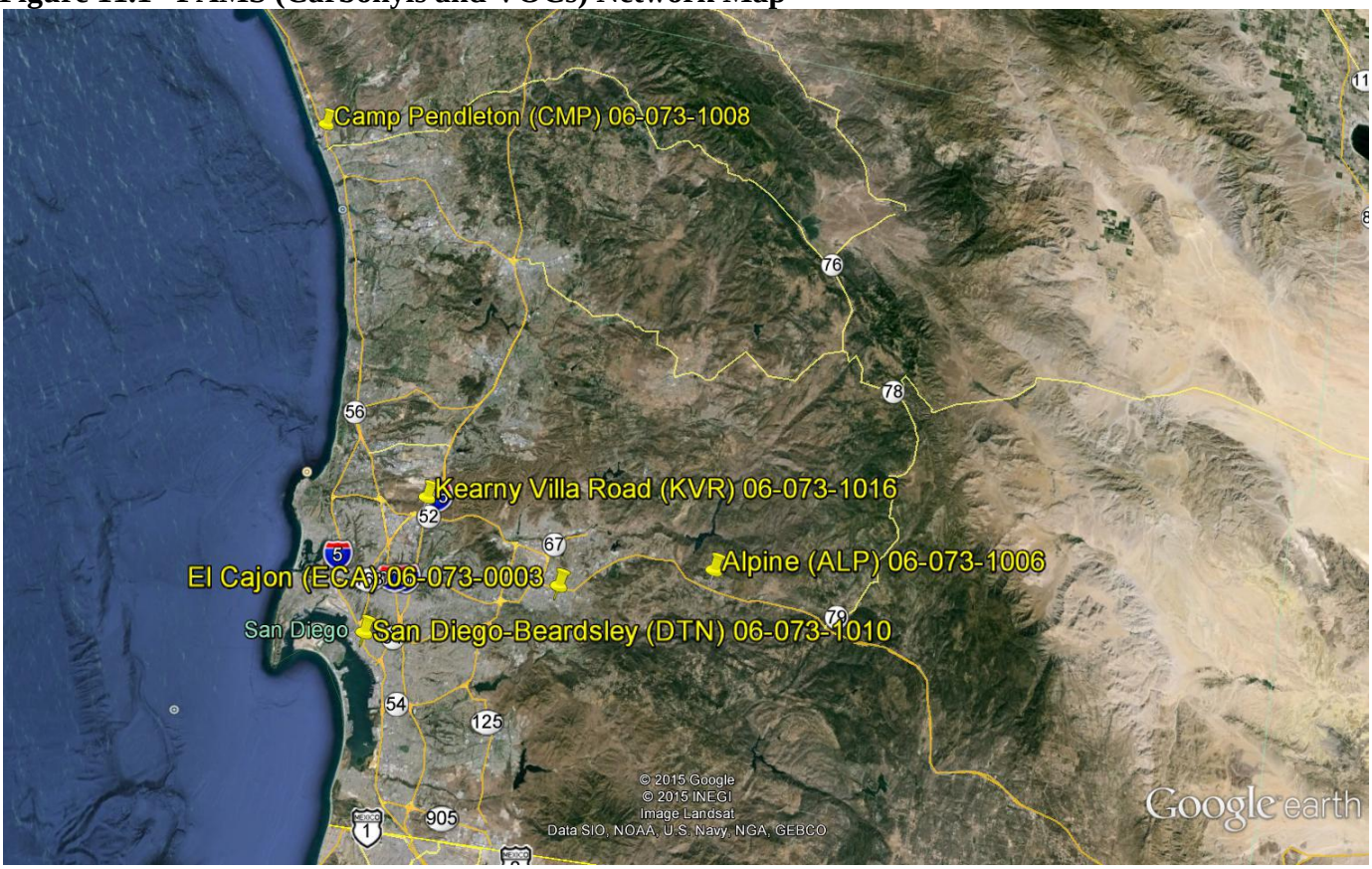
Chapter 11 Photochemical Assessment Monitoring Stations (PAMS)

Section 11.0.0 PAMS Monitor and Station Introduction

PAMS and PAMS-related sampling was conducted at four sites (see Figure 11.1). KVR is a PAMS-Carbonyl site, but due to irreparable failure of the sampler in late 2011, sampling there was halted. As of yet, there are no NAAQS standards to compare the data. Please note:

- The El Cajon station was temporarily relocated to the Gillespie Field area off of Floyd Smith Drive; this station is called Floyd Smith Drive (FSD).
- PAMS-VOC data are collected at CMP, ALP, and ECA.
- PAMS-Carbonyl data are collected at KVR and ECA.
- Unofficial PAMS-Carbonyl data are collected at DTN.

Figure 11.1 PAMS (Carbonyls and VOCs) Network Map



The range of compounds for the PAMS program is in excess of 50 different possible ozone precursors and other compounds (see Tables 11.1a and 11.1b). The toxicity is gauged by risk factors instead of limits.

The reported concentrations reflect a mix of the station move listed above. Because the Floyd Smith Drive relocation is temporary, the maps and table parameters reflect the permanent site metadata (labeled as ECA).

Table 11.1a PAMS VOC Parameter Codes

Compound	Parameter
Ethylene	43203
Acetylene	43206
Ethane	43202
Propylene	43205
Propane	43204
Isobutane	43214
Isobutylene	43270
1-Butene	43280
n-Butane	43212
trans-2-Butene	43216
cis-2-Butene	43217
Isopentane	43221
1-Pentene	43224
n-Pentane	43220
Isoprene	43243
Trans-2-pentene	43226
cis-2-Pentene	43227
2.2-Dimethylbutane	43244
Cyclopentane	43242
2.3-Cimethylbutane	43284
2-Methylpentane	43285
3-Methylpentane	43230
1-Hexene	43245
n-Hexane	43231
Methylcyclopentane	43262
2.4-Dimethylpentane	43247
Benzene	45201
cyclohexane	43248
2-Methylhexane	43263
2.3-Dimethylpentane	43291

Compound	Parameter
3-Methylhexane	43249
2.2.4-Trimethylpentane	43250
n-Heptane	43232
Methylcyclohexane	43261
2.3.4-Trimethylpentane	43252
Toluene	45202
2-Methylheptane	43960
3-Methylheptane	43253
n-Octane	43233
Ethylbenzene	45203
m-Xylene	45205
p-Xylene	45206
Styrene	45220
o-Xylene	45204
n-Nonane	43235
Isopropylbenzene	45210
n-Propylbenzene	45209
1-Ethyl 3-methylbenzene	45212
1-Ethyl 4-methylbenzene	45213
1.3.5-Trimethylbenzene	45207
1-Ethyl 2-methylbenzene	45211
1.2.4-Trimethylbenzene	45208
n-Decane	43238
1.2.3-Trimethylbenzene	45225
m-Diethylbenzene	45218
p-Diethylbenzene	45219
Undecane	43954
Total PAMS	43000
Total NMOC	43102

Table 11.1b PAMS Carbonyls Parameter Codes

Compound	Parameter
Formaldehyde	43502
Acetaldehyde	43503
Acetone	43551

Section 11.1.0 PAMS Monitor and Station Summary

The EPA does not have Network Assessment tools available for PAMS-VOC or PAMS-Carbonyl sampler and station comparison. The District used other means to ascertain the viability of the PAMS sites. Additionally, the EPA will re-engineer the PAMS-VOC program to be mandatory at NCore locations and subjective at non-NCore locations in the SDAB. Table 11.3 is a summary of the multilayered approach for evaluating PAMS-VOC samplers and stations.

Table 11.2 PAMS-VOC Sampler Summary Rating

	Overall Scoring	**COMMENTS**	**1.** PAMS Designation	**2.** Community Type	**3.** Ozone	**4.**Other
El Cajon (ECA)	**30**	**1:** PAMS II **2:** Light Industrial/mixed use **3:** Routinely tied for 2nd highest with ESC **4:** Required for NCore; recently moved	6	7	7	10
Alpine (ALP)	**32**	**1:** PAMS III **2:** Bedroom **3:** Ozone Design Value site **4:** Downwind and elevated from ECA	8	9	10	5
Camp Pendleton (CMP)	**33**	**1:** PAMS I **2:** Bedroom **3:** Routinely 3rd or 4th highest in the County **4:** Records transport from the South Coast Air Basin	7	10	8	8

Section 11.1.1 PAMS-VOC Samplers and Station Evaluation Explanation

The District recommends retaining PAMS-VOC samplers/analysis at the Camp Pendleton location (PAMS VOC will be required at ECA), once the EPA re-engineers the program.

Section 11.2.0 PAMS-Carbonyls Samplers Summary

Formaldehyde is the number one cancer driver in the United States. According to the EPA NATA database, formaldehyde is pervasive throughout the County. The District monitors for formaldehyde are in the PAMS-Carbonyl program. The EPA recognizes the need for monitoring formaldehyde more closely and will re-engineer the PAMS-Carbonyl program after the new PAMS-VOC requirements have been implemented. Because formaldehyde has such a deleterious effect on human health, the District has expanded the Carbonyl network to include the DTN station (and the DVN station by January 1, 2016) without federal funding. Table 11.4 is a summary of the multilayered approach for evaluating PAMS-Carbonyls samplers and stations.

Table 11.3 PAMS-Carbonyl Sampler Summary Rating

	Overall Scoring	**COMMENTS**	**1.** PAMS Designation	**2.** Community Type	**3.** NATA	**4.**Other
El Cajon (ECA)	**30**	**1:** PAMS II **2:** Light Industrial/mixed use **3:** Formaldehyde is the highest pollutant contribution at 46% **4:** Collocated with VOC	6	7	6	10
Kearny Villa Rd. (KVR)	**31**	**1:** PAMS III **2:** Bedroom **3:** Formaldehyde is the highest pollutant contribution at 49% **4:** Augments ECA	8	9	8	6
San Diego-Beardsley (DTN)	**24**	**1:** Unofficial PAMS, so no designation **2:** Heavy Industrial/mixed use **3:** Formaldehyde is the highest pollutant contribution at 41% **4:** EJ area; across from Near-road site	n/a	10	4	10
Otay Mesa-Donovan (DVN)	**28**	**1:** Unofficial PAMS, so no designation **2:** Heavy Industrial/becoming mixed use **3:** Formaldehyde is the highest pollutant contribution at 50% **4:** Border crossing	n/a	8	10	10
San Ysidro (SAY)	**24**	**1:** Unofficial PAMS, so no designation **2:** Mixed use **3:** Formaldehyde is the highest pollutant contribution at 41% **4:** Border crossing	n/a	10	4	10
Rancho Carmel Drive (RCD)	**27**	**1:** n/a **2:** Bedroom community **3:** Formaldehyde is the highest pollutant contribution at 49% **4:** 1st Near-road site	n/a	8	9	10
Escondido (ESC)	**25**	**1:** Unofficial PAMS, so no designation **2:** Mixed use with light industry **3:** Formaldehyde is the highest pollutant contribution at 45% **4:** Closest to 1st Near-road site	n/a	10	5	10
Newton Ave (NTA)	**23**	**1:** Unofficial PAMS, so no designation **2:** Heavy Industrial/mixed use **3:** Formaldehyde is the highest pollutant contribution at 40% **4:** 2nd Near-road site (projected site-not in place)	n/a	10	3	10

Section 11.2.1 PAMS-Carbonyls Samplers and Station Evaluation Explanation

The District recommends retaining PAMS-VOC samplers/analysis at the Camp Pendleton location (PAMS VOC will be required at ECA), once the EPA re-engineers the program.

If staffing is sufficient, the District will seek additional funding to expand the Carbonyl network. It will include sampling for formaldehyde at the two near-road locations and the ambient air monitoring stations closest to the near-road stations. If a permanent air monitoring station is established in the San Ysidro border crossing area, formaldehyde sampling is recommended for this location as well.

Chapter 12 Toxics Program

Section 12.0.0 Toxics Introduction

Toxics-related sampling was conducted at five sites: three SDAPCD sites and two CARB sites (Figure 12.1). As of yet, there are no NAAQS standards which to compare the data. Please note:

- The El Cajon station was temporarily relocated to the Gillespie Field area off of Floyd Smith Drive; this station is called Floyd Smith Drive (FSD).
- The Otay Mesa (OTM) station was permanently relocated to the Donovan State Prison area; this station is called Donovan (DVN).
- Toxics-VOC data were collected at DVN, DTN, and ESC.
- Toxics-Metals data were collected at DTN and DVN.
- Toxics-Metals, VOC, and Carbonyls data were collected at ECA and CVA for the CARB CA-TAC program.

Figure 12.1 Toxics Network Map

The reported concentrations reflect a mix of the two station moves listed above. Because the Donovan relocation is permanent, the maps and table parameters reflect the new site metadata (labeled as DVN). Because the Floyd Smith Drive relocation is temporary, the maps and table parameters reflect the permanent site metadata (labeled as ECA).

The range of defined compounds for the Toxics program is in excess of 100 different possible carcinogenic, irritant, and mutagenic chemicals. Their toxicities are gauged by risk factors rather than limits. The VOC analyzed compounds are in Table 12.1. Currently, Toxic-Metals are collected but not analyzed (analysis is projected to start by July 1, 2016).

Table 12.1 Toxics VOCs Parameters Codes

Compound	*Parameter*	*Compound*	*Parameter*
Dichlorodifluoromethane	43823	Toluene	45202
Chloromethane	43801	1,2-Dibromoethane	43843
4-Methyl-2-pentanone (MIBK)	43560	2-Methoxy-2-methylpropane	43372
Vinyl Chloride	43860	Chlorobenzene	45801
1,3-Butadiene	43218	Ethylbenzene	45203
Bromomethane	43819	m,p-Xylene	45109
Chloroethane	43812	Tetrachloroethene	43817
Trichlorofluoromethane	43811	1,1,2-Trichloroethane	43820
Acrolein	43505	Benzene	45201
Acetone	43551	1,1,1-Trichloroethane	43814
2-Methyl-1,3-butadiene	43243	Carbon Tetrachloride	43804
1,1-Dichloroethene	43826	cis-1,3-Dichloropropene	43831
Acrylonitrile	43704	1,2-Dichloroethane	43815
Methylene Chloride	43802	Trichloroethene	43824
Trichlorotrifluoroethane	43207	cis-1,2-Dichloroethene	43839
trans-1,2-Dichloroethene	43838	Chloroform	43803
1,1,2,2-Tetrachloroethane	43818	Naphthalene	45850
1,1-Dichloroethane	43813	1,2-Dichloropropane	43829
2-Butanone	43552	Chlorobenzene	45801
Bromoform	43806	trans-1,3-Dichloropropene	43830
Styrene	45220	Acetonitrile	43702
o-Xylene	45204	Vinyl acetate	43447
4-Ethyltoluene	45213	n-Hexane	43231
1,3,5-Trimethylbenzene	45207	Ethyl acetate	43209
1,2,4-Trimethylbenzene	45208	Methyl methacrylate	43441
1,3-Dichlorobenzene	45806	Dichlorotetrafluoroethane	43208
1,4-Dichlorobenzene	45807	Benzyl chloride	45809
1,2-Dichlorobenzene	45805	Hexachlorobutadiene	43844
1,2,4-Trichlorobenzene	45810		

Section 12.1.0 Toxics Monitors and Station Evaluation, Summary

The EPA does not have Network Assessment tools available for Toxic-VOC or Toxic-Metals sampler and station comparison. The District used other means to ascertain the viability of the Toxics sites. The District will not evaluate CARB Toxics sites. Table 12.2 is a summary of the Toxics-VOC findings.

Table 12.2 Toxic-VOC Sampler Summary Rating

	Overall Scoring	COMMENTS	1. Community Need	2. Community Type	3. NATA	4. Other
Escondido (ESC)	**33**	**1:** Downwind of agriculture fields **2:** Mixed use with light industry **3:** Average total risk: 68 million **4:** Closest to 1st Near-road site; northern most site	8	10	7	8
San Diego-Beardsley (DTN)	**40**	**1:** Requested by the community **2:** Heavy Industrial/mixed use **3:** Average total risk: 97 million **4:** EJ area; across from Near-road site	10	10	10	10
Otay Mesa-Donovan (DVN)	**32**	**1:** 2nd fastest growing area **2:** Heavy Industrial/becoming mixed use **3:** Average total risk: 64 million **4:** Downwind of San Ysidro and Otay border crossings	8	8	6	10
San Ysidro (SAY)	**43**	**1:** Requested by the community **2:** Mixed use **3:** Average total risk: 70 million **4:** Border crossing	8	10	7	8
Rancho Carmel Drive (RCD)	**30**	**1:** Highest trafficked area in the County **2:** Bedroom community **3:** Average total risk: 62 million **4:** 1st Near-road site	6	8	6	10
Newton Ave (NTA)	**36**	**1:** Requested by the community **2:** Heavy Industrial/mixed use **3:** Average total risk: 91 million **4:** 2nd Near-road site (projected site-not in place)	8	10	8	10

Average total risk is defined as a risk level of 1 in a million implies a likelihood that up to one person, out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the specific concentration over 70 years (an assumed lifetime). This risk would be an excess cancer risk that is in addition to any cancer risk borne by a person not exposed to these air toxics. Note that this assessment looks at lifetime cancer risks, which should not be confused with or compared to annual cancer risk estimates. If you would like to compare an annual cancer risk estimate with the results in this assessment, you would need to multiply that annual estimate by a factor of 70 or alternatively divide the lifetime risk by a factor of 70

Section 12.1.1 Toxic-VOC Samplers and Station Evaluation Explanation

The District recommends retaining all Toxic-VOC sampling locations. Once the EPA re-engineers the PAMS-VOC program and there is sufficient staffing, the District will seek funding to expand the network to include the two Near-road locations and San Ysidro (if a permanent air monitoring station is sited near the border crossing).

Section 12.1.2 Toxic-Metals Samplers and Station Summary

The District recommends retaining all Toxic-Metals sampling locations. Currently, Metals are collected but not analyzed. The program is projected to begin analysis by July 1, 2016. Once Metals analysis is established, the backlog of stored filters will be undertaken. Until this backlogged is relieved, no additional stations are recommended. Table 12.3 is a summary of the scoring for the Toxics-Metals program.

Table 12.3 Toxic-Metals Sampler Summary Rating

	Overall Scoring	**COMMENTS**	**1.** Community Need	**2.** Community Type	**3.** NATA	**4.**Other
Escondido (ESC)	**33**	**1:** Downwind of agriculture fields **2:** Mixed use with light industry **3:** Average total risk: 68 million **4:** Closest to 1st Near-road site; northern most site	8	10	7	8
San Diego-Beardsley (DTN)	**40**	**1:** Requested by the community **2:** Heavy Industrial/mixed use **3:** Average total risk: 97 million **4:** EJ area; across from 2nd Near-road site	10	10	10	10
Otay Mesa-Donovan (DVN)	**32**	**1:** 2nd fastest growing area **2:** Heavy Industrial/becoming mixed use **3:** Average total risk: 64 million **4:** Downwind of San Ysidro and Otay border crossings	8	8	6	10