

# State of Hawaii Annual Summary 2012 Air Quality Data



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# 2012 Hawaii Air Quality Data

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# Section 1

## INTRODUCTION

The Department of Health, Clean Air Branch, monitors the ambient air in the State of Hawaii for various gaseous and particulate air pollutants. The U. S. Environmental Protection Agency (EPA) has set national ambient air quality standards (NAAQS) for six criteria pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>). Hawaii has also established a state ambient air standard for hydrogen sulfide. The primary purpose of the statewide monitoring network is to measure ambient air concentrations of these pollutants and ensure that these air quality standards are met. The stations are maintained and the data are collected by the Air Surveillance and Analysis Section of the State Laboratories Division.

In addition to monitoring the ambient air for criteria pollutants, the State of Hawaii also participates in the national PM<sub>2.5</sub> speciation monitoring program. The EPA determined that speciation was essential for establishing a relationship between particle concentrations and adverse health effects and would provide valuable information in characterizing aerosols, determining the effectiveness of control strategies, and understanding the effects of particle pollution on atmospheric and regional haze.

Air pollution is caused by many different man-made and natural sources. There are industrial sources of pollution, such as power plants and refineries; mobile sources, such as cars, trucks, and buses; agricultural sources, such as cane burning; and natural sources, such as windblown dust and volcanic activity. In 2012, for the most part, the state maintained 13 air monitoring stations on 4 islands. Most commercial, industrial, and transportation activities and their associated air quality effects occur on Oahu, where 4 of the stations are located. The monitoring station on Maui is mainly to measure the air quality impacts from agricultural activities. The majority of stations are located on the island of Hawaii to measure air quality impacts from the volcano and geothermal energy production. The monitoring station on Kauai is mainly to measure the air quality impacts from cruise ships. The state's ambient air monitoring network is reviewed annually and relocations, additions and/or discontinuations can occur in the future as the need arises.

This report summarizes the validated air pollutant data collected at the 13 monitoring stations during calendar year 2012. Tabular summaries are provided which compare the measured concentrations of criteria pollutants with federal ambient air quality standards and of hydrogen sulfide with the state standard. The 2012 speciation data is also included in this report. Trend summaries of criteria pollutants parameters are shown graphically.

The Department of Health has a web site that displays near real-time air quality data updated throughout the day from the air monitoring stations. The data has not been reviewed for quality assurance and is subject to change but provides the public with viewing access to current air pollutant and meteorological information. To view this data online, go to <http://health.hawaii.gov/cab> and link to “Hawaii Ambient Air Quality Data.”

Additionally, because emissions from the Kilauea volcano are affecting communities on the island of Hawaii on a daily basis, the Department of Health has a website dedicated to displaying short term SO<sub>2</sub> data from stations located on the island. It provides near real-time 15-minute SO<sub>2</sub> averages and advisory level guidance to help individuals protect themselves against possible health effects. To view this data online, go to [www.hiso2index.info](http://www.hiso2index.info)

To view this entire book as well as books from 2010 and 2011 online, go to: <http://health.hawaii.gov/cab> and link to “Hawaii Air Quality Data Book.”

Questions or comments regarding data in this report and other air quality information should be addressed to:

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Cover photo is a view of Molokini Crater with the Island of Kaho’olawe behind it.

## Section 2

# DEFINITIONS

<i>98<sup>th</sup> Percentile Value</i>	The PM <sub>2.5</sub> 24-hour average or the maximum daily 1-hour NO <sub>2</sub> average in the year below which 98% of all values fall.
<i>99<sup>th</sup> Percentile Value</i>	The maximum daily 1-hour SO <sub>2</sub> value in the year below which 99% of all values fall.
<i>Ambient Air</i>	The general outdoor atmosphere, external to buildings, to which the general public has access.
<i>Ambient Air Quality Standard</i>	A limit in the quantity and exposure to pollutants dispersed or suspended in the ambient air. Primary standards are set to protect public health, including sensitive populations such as asthmatics, children, and the elderly. Secondary standards are set to protect public welfare including protection against visibility degradation, and damage to animals, crops, vegetation and buildings.
<i>Carbon Monoxide</i>	Carbon monoxide (CO) is a colorless, odorless, tasteless gas under atmospheric conditions. It is produced by the incomplete combustion of carbon fuels with the majority of emissions coming from transportation sources.
<i>CFR</i>	Code of Federal Regulations is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal government. Title 40 is the Protection of the Environment.
<i>Collocated</i>	This is a procedure required for a certain percentage of PM <sub>10</sub> and PM <sub>2.5</sub> samplers in the monitoring network. Collocated samplers determine precision or variation in the PM <sub>10</sub> or PM <sub>2.5</sub> concentration measurements of identical samplers run in the same location under the same sampling conditions.
<i>Criteria Pollutants</i>	These are the six pollutants for which the EPA has established national air quality standards. The pollutants are ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead and particulate matter (PM <sub>10</sub> and PM <sub>2.5</sub> ).
<i>EPA</i>	The U. S. Environmental Protection Agency; established to protect human health and the natural environment.

<i>Hydrogen Sulfide</i>	Hydrogen sulfide (H <sub>2</sub> S) is a toxic, colorless gas with a characteristic “rotten egg” odor detectable at very low levels. It occurs naturally during the decomposition of organic matter and is also produced during certain industrial processes.
<i>Micron</i>	One micron is one millionth of a meter or approximately 1/25,000 of an inch.
$\mu\text{g}/\text{m}^3$	Micrograms per cubic meter. This is the measurement of air quality expressed as mass per unit volume.
$\text{ng}/\text{m}^3$	Nanograms per cubic meter. One nanogram is one-billionth of a gram, expressed as mass per unit volume.
<i>NAAQS</i>	National Ambient Air Quality Standards. These are pollutant standards that the EPA has established to protect public health and welfare. NAAQS have been set for carbon monoxide, nitrogen dioxide, PM <sub>10</sub> , PM <sub>2.5</sub> , ozone, sulfur dioxide, and lead. These are commonly referred to as criteria pollutants.
<i>Nitrogen Dioxide</i>	Nitrogen dioxide (NO <sub>2</sub> ) is a brownish, highly corrosive gas with a pungent odor. It is formed in the atmosphere from emissions of nitrogen oxides (NO <sub>x</sub> ). Sources of nitrogen oxides include electric utilities, industrial boilers, motor vehicle exhaust and combustion of fossil fuels. NO <sub>2</sub> is also a component in the atmospheric reaction that produces ground-level ozone.
<i>Ozone</i>	Ozone (O <sub>3</sub> ) is the main constituent in photochemical air pollution. It is formed in the atmosphere by a chemical reaction of nitrogen oxides (NO <sub>x</sub> ) and volatile organic compounds (VOCs) in the presence of sunlight. In the upper atmosphere, O <sub>3</sub> shields the earth from harmful ultraviolet radiation; however, at ground level, it can cause harmful effects in humans and plants.
<i>Particulate Matter</i>	This refers to any solid or liquid matter dispersed in the air. Particulate matter (PM) includes dust, soot, smoke, and liquid droplets from sources such as factories, power plants, motor vehicles, construction, agricultural activities, and fires.

<i>PM<sub>10</sub></i>	Particulate matter that is 10 microns or less in aerodynamic diameter. These are considered “coarse” particles, generally from sources such as road and windblown dust, and crushing and grinding operations.
<i>PM<sub>2.5</sub></i>	Particulate matter that is 2.5 microns or less in aerodynamic diameter. Considered “fine” particles, these are generally a result of fuel combustion such as from motor vehicles, utility generation and industrial facilities. Fine particles can also be formed when gases, such as sulfur dioxide and nitrogen dioxide, are chemically transformed into particles.
<i>ppbC</i>	Parts per billion carbon denotes one carbon particle in 1,000,000,000 other carbon particles. This is the unit used in measuring certain air toxics parameters.
<i>ppm</i>	Parts per million is one particle in 1,000,000 other particles. It is approximately one drop in 13 gallons.
<i>SLAMS</i>	State and Local Air Monitoring Stations. The Clean Air Act requires that every state establish a network of air monitoring stations for criteria pollutants.
<i>SPM</i>	Special Purpose Monitoring stations. These are stations established to provide data for special studies in support of air program interests and activities. SPM stations supplement the SLAMS network as circumstances require and resources permit.
<i>Sulfur Dioxide</i>	Sulfur dioxide (SO <sub>2</sub> ) is a colorless gas that easily combines with water vapor forming sulfuric acid. Emissions of sulfur dioxide are largely from sources that burn fossil fuels such as coal and oil. In Hawaii, another major source of sulfur dioxide emissions is from the eruption of Kilauea Volcano on the Big Island.
<i>VOCs</i>	Volatile Organic Compounds. These compounds are emitted as gases from certain solids or liquids such as paints and lacquers; pesticides; cleansers and disinfectants; automotive products; and hobby supplies including glues and adhesives.
<i>Vog</i>	Vog is a local term used to express volcanic smog. Vog occurs when volcanic gas and particles combine with air and sunlight to produce atmospheric haze.

## Table 2-1 State and Federal Ambient Air Quality Standards

Sources: State standards HAR §11-59; Federal standards 40 CFR Part 50

Air Pollutant	Averaging Time	Standards		
		Hawaii State Standard	Federal Primary Standard <sup>a</sup>	Federal Secondary Standard <sup>b</sup>
Carbon Monoxide (CO)	1-hour	9 ppm	35 ppm	None
	8-hour	4.4 ppm	9 ppm	
Nitrogen Dioxide (NO <sub>2</sub> )	1-hour	---	0.100 ppm	---
	Annual	0.04 ppm	0.053 ppm	0.053 ppm
PM <sub>10</sub>	24-hour	150 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>
	Annual <sup>c</sup>	50 µg/m <sup>3</sup>	---	---
PM <sub>2.5</sub>	24-hour	---	35 µg/m <sup>3</sup>	35 µg/m <sup>3</sup>
	Annual <sup>eff. 12/14/2012</sup>		12 µg/m <sup>3</sup>	15 µg/m <sup>3</sup>
Ozone (O <sub>3</sub> )	8-hour	0.08 ppm	0.075 ppm	0.075 ppm
Sulfur Dioxide (SO <sub>2</sub> )	1-hour	---	0.075 ppm	---
	3-hour	0.5 ppm	---	0.5 ppm
	24-hour	0.14 ppm	---	---
	Annual	0.03 ppm	---	---
Lead (Pb)	Calendar Quarter	1.5 µg/m <sup>3</sup>	0.15 µg/m <sup>3</sup>	0.15 µg/m <sup>3</sup>
Hydrogen Sulfide	1-hour	0.025 ppm	None	None

<sup>a</sup> **Primary Standards** set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children and the elderly.

<sup>b</sup> **Secondary Standards** set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

<sup>c</sup> Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, EPA revoked the annual PM<sub>10</sub> standard effective December 17, 2006. However, the state still has an annual standard.

### Compliance with the National Ambient Air Quality Standards

**CO 1-hour:** May not be exceeded more than once per year.

**CO 8-hour:** May not be exceeded more than once per year.

**NO<sub>2</sub> 1-hour:** The 3-year average of the 98<sup>th</sup> percentile daily maximum 1-hour averages must not exceed the standard.

**NO<sub>2</sub> Annual:** Average of all 1-hour values in the year may not exceed the level of the standard.

**PM<sub>10</sub> 24-hour:** Must not be exceeded more than one day per year, after compensating for days when monitoring did not occur (estimated number of exceedances)

**PM<sub>2.5</sub> 24-hour:** The 3-year average of the 98<sup>th</sup> percentile 24-hour concentrations must not exceed the level of the standard.

**PM<sub>2.5</sub> Annual:** The 3-year average of 24-hour values must not exceed the level of the standard.

**Ozone 8-hour:** The 3-year average of the fourth highest daily maximum value must not exceed the level of the standard.

**SO<sub>2</sub> 1-hour:** The 3-year average of the 99<sup>th</sup> percentile daily maximum 1-hour averages must not exceed the standard.

**SO<sub>2</sub> 3-hour:** Not be exceeded more than once per year.

**SO<sub>2</sub> 24-hour:** Not be exceeded more than once per year.

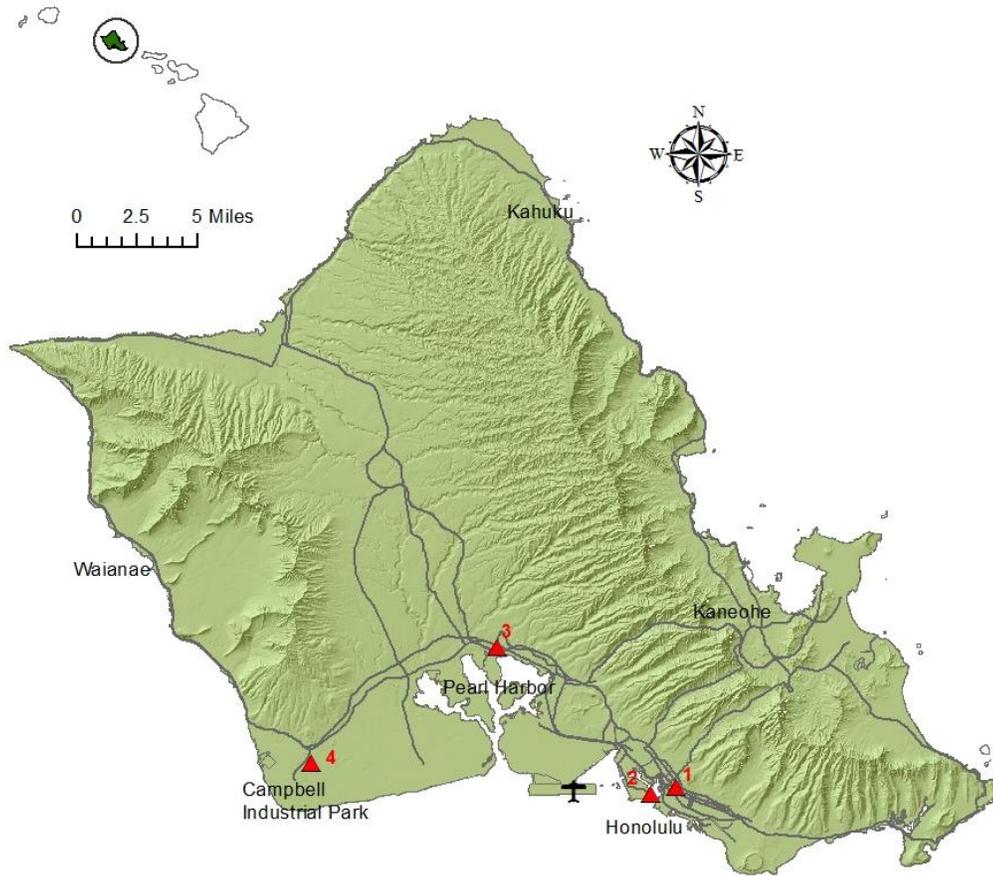
**SO<sub>2</sub> Annual:** Average of all 1-hour values in the year may not exceed the level of the standard.

**Lead :** Average of all 24-hour values in any calendar quarter may not exceed the level of the standard.

# Section 3

## SITE LOCATIONS AND DESCRIPTIONS

**Figure 3-1: Island of Oahu Air Monitoring Stations**



Station	Name	Location	Pollutants Monitored
1	Honolulu	1250 Punchbowl St.	PM <sub>10</sub> , PM <sub>2.5</sub> , CO, SO <sub>2</sub>
2	Sand Island	1039 Sand Island Pkwy	O <sub>3</sub> , PM <sub>2.5</sub>
3	Pearl City	860 4th St.	PM <sub>10</sub> , PM <sub>2.5</sub>
4	Kapolei	2052 Lauwiliwili St.	PM <sub>10</sub> , PM <sub>2.5</sub> , CO, SO <sub>2</sub> , NO <sub>2</sub>
	Kapolei NCore	2052 Lauwiliwili St.	PM <sub>10-2.5</sub> , SO <sub>2</sub> trace, NO/NO <sub>y</sub> , CO, O <sub>3</sub> , Pb, PM <sub>2.5</sub> speciation, WSWD

The following station descriptions include latitude and longitude in decimal degrees and altitude in meters above mean sea level.

<b>Honolulu (DH)</b>		
	<b>Location:</b>	1250 Punchbowl St., Honolulu
	<b>Latitude:</b>	21.30758
	<b>Longitude:</b>	-157.85542
	<b>Altitude:</b>	20 m
	<b>Parameters:</b>	SO <sub>2</sub> , CO, PM <sub>10</sub> , PM <sub>2.5</sub>
	<b>Established:</b>	February 1971
	<b>Brief Description:</b>	Located in downtown Honolulu on the roof of the Department of Health building, across from the Queen's Medical Center, in a busy commercial, business and government district.

<b>Kapolei (KA)</b>		
	<b>Location:</b>	2052 Lauwiliwili St., Kapolei
	<b>Latitude:</b>	21.32374
	<b>Longitude:</b>	-158.08861
	<b>Altitude:</b>	17.9 m
	<b>Parameters:</b>	SO <sub>2</sub> , CO, NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub> , PM <sub>2.5</sub> speciation, NCore
	<b>Established:</b>	July 2002
	<b>Brief Description:</b>	Located in the Kapolei Business Park, southeast of the Kapolei Fire Station, next to a drainage canal that separates the park from Barber's Point.

<b>Pearl City (PC)</b>		
	<b>Location:</b>	860 4 <sup>th</sup> St., Pearl City
	<b>Latitude:</b>	21.39283
	<b>Longitude:</b>	-157.96913
	<b>Altitude:</b>	23.1 m
	<b>Parameters:</b>	PM <sub>10</sub> , PM <sub>2.5</sub>
	<b>Established:</b>	May 1979
	<b>Brief Description:</b>	Located on the roof of the Leeward Health Center in a commercial, residential and light industrial area approximately 1.5 miles northwest of the Waiiau power plant and near the Pearl Harbor Naval Complex.

### Sand Island (SI)



**Location:** 1039 Sand Island Pkwy.,  
Honolulu

**Latitude:** 21.30384

**Longitude:** -157.87712

**Altitude:** 5.3 m

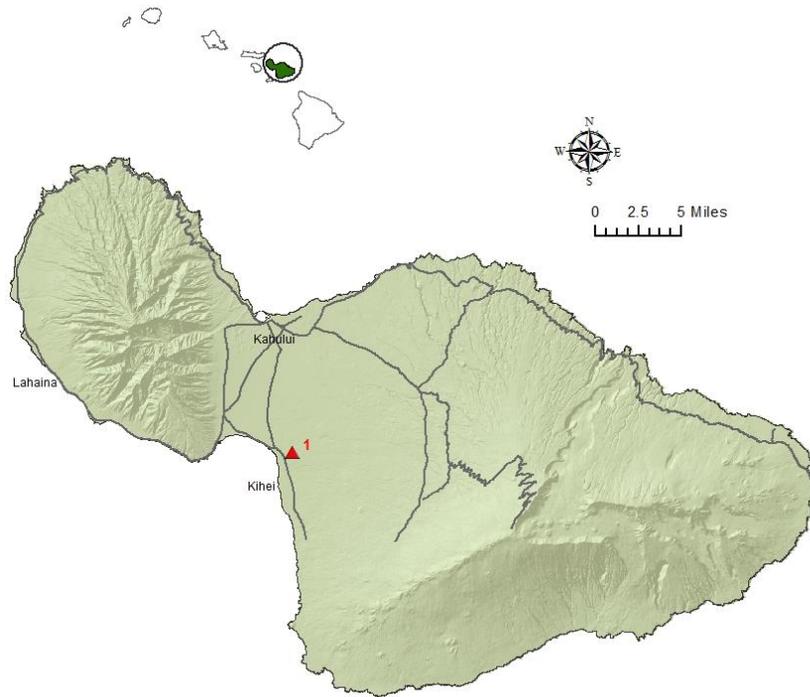
**Parameters:** O<sub>3</sub>, PM<sub>2.5</sub>

**Established:** February 1981

**Brief Description:**

Located in a light industrial, commercial and recreational area approximately two miles downwind of downtown Honolulu near the entrance to the Sand Island State Recreation Area.

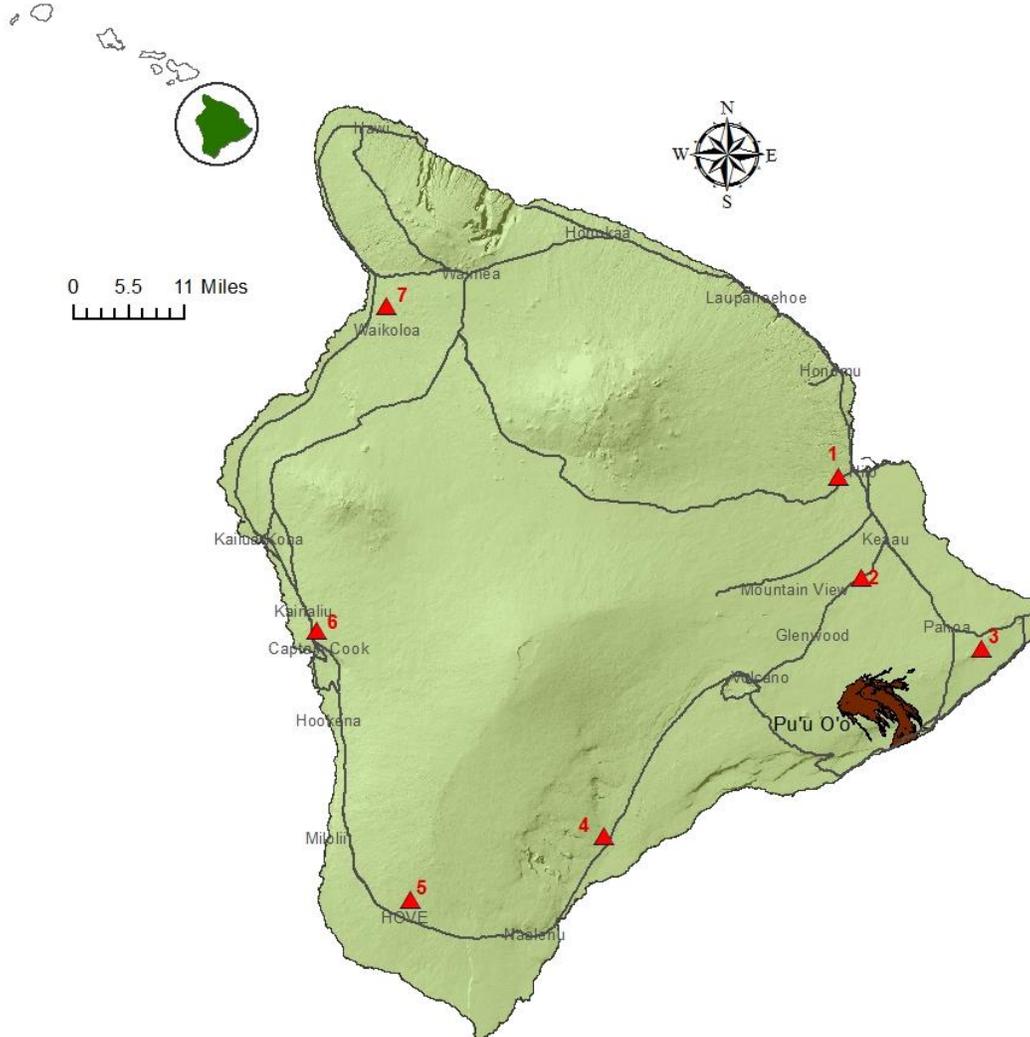
**Figure 3-2: Island of Maui - Air Monitoring Station**



Station	Name	Location	Pollutants Monitored
1	Kihei	Hale Piilani Park	PM <sub>2.5</sub>

<b>Kihei (KH)</b>	
	<b>Location:</b> Hale Piilani Park, Kihei
	<b>Latitude:</b> 20.780997
	<b>Longitude:</b> -156.44637
	<b>Altitude:</b> 46.5 m
	<b>Parameters:</b> PM <sub>2.5</sub>
	<b>Established:</b> February 1999
	<b>Brief Description:</b> Located in a residential community park, next to agricultural land.

**Figure 3-3: Island of Hawaii - Air Monitoring Stations**



Station	Name	Location	Pollutants Monitored
1	Hilo	1099 Waianuenue Ave.	PM <sub>2.5</sub> , SO <sub>2</sub>
2	Mountain View	17-1235 Volcano Rd.	PM <sub>2.5</sub> , SO <sub>2</sub>
3	Puna E	TMK (3)-1-3-28-37 (Leilani)	H <sub>2</sub> S, SO <sub>2</sub>
4	Pahala	96-3150 Pikake St.	PM <sub>2.5</sub> , SO <sub>2</sub>
5	Ocean View	92-6091 Orchid Mauka Circ.	PM <sub>2.5</sub> , SO <sub>2</sub>
6	Kona	81-1043 Konawaena School Rd.	PM <sub>2.5</sub> , SO <sub>2</sub>
7	Waikoloa	TMK (3)-6-8-002-019	PM <sub>2.5</sub> , SO <sub>2</sub>

<b>Hilo (HL)</b>		
	<b>Location:</b>	1099 Waianuenue Ave., Hilo
	<b>Latitude:</b>	19.71756
	<b>Longitude:</b>	-155.11053
	<b>Altitude:</b>	136.8 m
	<b>Parameters:</b>	SO <sub>2</sub> , PM <sub>2.5</sub>
	<b>Established:</b>	January 1997
	<b>Brief Description:</b>	
<p>Located near the Hilo Medical Center, this station was established to monitor vog during “Kona” or southerly wind conditions.</p>		

<b>Kona (KN)</b>		
	<b>Location:</b>	81-1043 Konawaena School Rd., Kona
	<b>Latitude:</b>	19.50978
	<b>Longitude:</b>	-155.91342
	<b>Altitude:</b>	517.2 m
	<b>Parameters:</b>	SO <sub>2</sub> , PM <sub>2.5</sub>
	<b>Established:</b>	September 2005
	<b>Brief Description:</b>	
<p>Located on the upper campus of Konawaena High School, this station monitors for vog on the west side of the island of Hawaii.</p>		

<b>Mt. View (MV)</b>		
	<b>Location:</b>	17-1235 Volcano Rd., Mt. View
	<b>Latitude:</b>	19.57002
	<b>Longitude:</b>	-155.08046
	<b>Altitude:</b>	436.5 m
	<b>Parameters:</b>	SO <sub>2</sub> , PM <sub>2.5</sub>
	<b>Established:</b>	December 2010
	<b>Brief Description:</b>	
<p>Located on the grounds of the Mt. View Elementary School, this station was established to monitor vog during southerly wind conditions.</p>		

### Ocean View (OV)



<b>Location:</b>	92-6091 Orchid Mauka Circle, Ocean View
<b>Latitude:</b>	19.11756
<b>Longitude:</b>	-155.77814
<b>Altitude:</b>	862.6 m
<b>Parameters:</b>	SO <sub>2</sub> , PM <sub>2.5</sub>
<b>Established:</b>	April 2010
<b>Brief Description:</b>	This station is located in Hawaii Ocean View Estates at the Ocean View fire station and monitors for volcanic emissions.

### Pahala (PA)



<b>Location:</b>	96-3150 Pikake St., Pahala
<b>Latitude:</b>	19.2039
<b>Longitude:</b>	-155.48018
<b>Altitude:</b>	320 m
<b>Parameters:</b>	SO <sub>2</sub> , PM <sub>2.5</sub>
<b>Established:</b>	August 2007
<b>Brief Description:</b>	The station is on the grounds of the Kau High and Pahala Elementary School, monitoring for volcanic emissions.

### Puna E (PE)



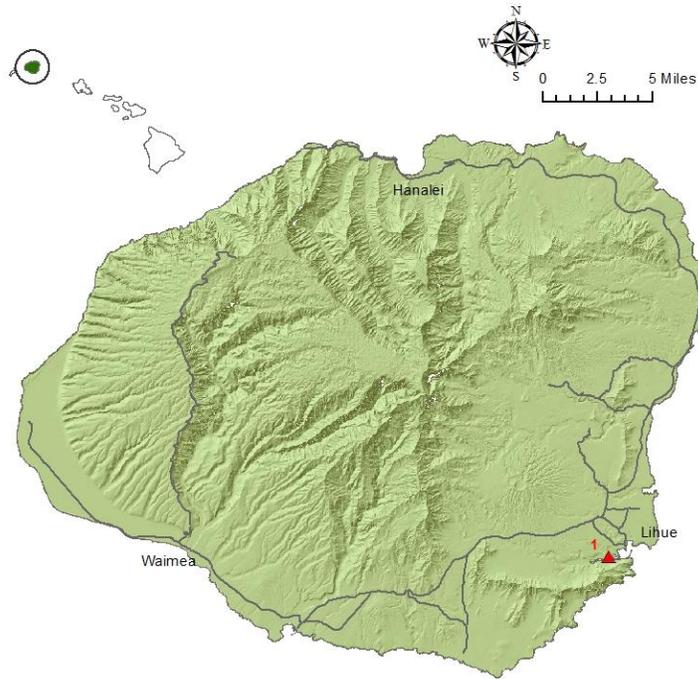
<b>Location:</b>	13-763 Leilani Ave., Pahoia
<b>Latitude:</b>	19.46399
<b>Longitude:</b>	-154.89871
<b>Altitude:</b>	207.9 m
<b>Parameters:</b>	SO <sub>2</sub> , H <sub>2</sub> S
<b>Established:</b>	March 1991
<b>Brief Description:</b>	Located in the Leilani Estates residential subdivision, this station monitors for emissions from the geothermal energy facility approximately 1 mile to the northeast. The station also monitors for SO <sub>2</sub> emissions from the volcano during southwesterly wind conditions.

### Waikoloa (WL)



<b>Location:</b>	TMK 3-6-8-002-019, Waikoloa
<b>Latitude:</b>	19.977467
<b>Longitude:</b>	-155.798067
<b>Altitude:</b>	180.1 m
<b>Parameters:</b>	SO <sub>2</sub> , PM <sub>2.5</sub>
<b>Established:</b>	August 2012
<b>Brief Description:</b>	This station is located within a fenced area that contains a County of Hawaii water tank and pump house, approximately 3 km northeast of Waikoloa. This station monitors for volcanic emissions.

**Figure 3-4: Island of Kauai Air Monitoring Station**



Station	Name	Location	Pollutants Monitored
1	Niumalu	2342 Hulemalu Rd.	SO <sub>2</sub> , NO <sub>2</sub> , CO, PM <sub>2.5</sub>

<b>Niumalu (NI)</b>		
	<b>Location:</b>	2342 Hulemalu Road, Lihue
	<b>Latitude:</b>	21.9495
	<b>Longitude:</b>	-159.365
	<b>Altitude:</b>	11 m
	<b>Parameters:</b>	SO <sub>2</sub> , CO, NO <sub>2</sub> , PM <sub>2.5</sub>
	<b>Established:</b>	April 2011
<b>Brief Description:</b>		
Located in the Niumalu residential subdivision, this station monitors for emissions from the cruise ships in Nawiliwili Harbor approximately 1.0 mile upwind.		

Table 3-1 State of Hawaii Ambient Air Monitoring Network

SITE	Pollutants Monitored and Station Type							MONITORING OBJECTIVE	LOCATION SETTING
	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub>	H <sub>2</sub> S		
<b>OAHU</b>									
Honolulu	S	S	S	-	S	-	-	Population Exposure	Urban and Center City
Kapolei	S	S,C	S	-	S	S	-	Population Exposure	Suburban
Pearl City	S	S	-	-	-	-	-	Population Exposure	Urban and Center City
Sand Island	-	S	-	S	-	-	-	Maximum Concentration (O <sub>3</sub> ) Transport (PM <sub>2.5</sub> )	Urban and Center City
<b>MAUI</b>									
Kihei	-	S	-	-	-	-	-	Source Impact (cane burning)	Suburban
<b>HAWAII</b>									
Hilo	-	SPM	-	-	S	-	-	Population Exposure	Suburban
Kona	-	SPM	-	-	S	-	-	Population Exposure (SO <sub>2</sub> )/ Maximum concentration (PM <sub>2.5</sub> )	Suburban
Mountain View	-	SPM	-	-	SPM	-	-	Source Impact	Suburban
Ocean View	-	SPM	-	-	SPM	-	-	Welfare Impact (SO <sub>2</sub> )/ Source Impact (PM <sub>2.5</sub> )	Rural
Pahala	-	SPM	-	-	SPM	-	-	Maximum concentration (SO <sub>2</sub> )/ Source Impact (PM <sub>2.5</sub> )	Rural
Puna E	-	-	-	-	SPM	-	SPM	Source Impact (geothermal and volcano)	Suburban
Waikoloa <sup>1</sup>	-	SPM	-	-	SPM	-	-	Source Impact	Suburban
<b>KAUAI</b>									
Niumalu	-	SPM	SPM	-	SPM	SPM	-	Source Impact (cruise ships)	Suburban

C = Collocated Site

S = (SLAMS) State and Local Air Monitoring Station

SPM = Special Purpose Monitoring Station (for monitoring vog and geothermal energy production)

<sup>1</sup> Waikoloa began operating 8/1/12

**Table 3-2 Sampling Equipment at Each Monitoring Station**

Monitoring Station	PM <sub>10</sub> Continuous Ambient Particulate Monitor	PM <sub>2.5</sub> Manual Particulate Monitor	PM <sub>2.5</sub> Continuous Monitor	CO Continuous Gas Filter Correlation Analyzer	SO <sub>2</sub> Continuous Pulsed Fluorescence Ambient Air Analyzer	O <sub>3</sub> Continuous UV Photometric Analyzer	NO <sub>2</sub> Continuous Chemiluminescence Analyzer	H <sub>2</sub> S Continuous Pulsed Fluorescence Ambient Air Analyzer
<b>OAHU</b>								
Honolulu	■		■	■	■			
Kapolei	■	■	■	■	■		■	
Pearl City	■		■					
Sand Island			■			■		
<b>MAUI</b>								
Kihei			■					
<b>HAWAII</b>								
Hilo			■		■			
Kona			■		■			
Mt. View			■		■			
Ocean View			■		■			
Pahala			■		■			
Puna E					■			■
Waikoloa			■		■			
<b>KAUAI</b>								
Niumalu			■	■	■		■	

## Section 4

# 2012 AIR QUALITY DATA

To protect the state's air quality from degradation, the Department of Health's Clean Air Branch is responsible for regulating and monitoring pollution sources to ensure that the levels of criteria pollutants remain well below the state and federal ambient air quality standards. Data collected from the ambient air network is validated by the Air Surveillance and Analysis Section to ensure that the reported data is of good quality and meets all quality control and assurance requirements.

The monitoring stations in communities near the volcano record higher levels of SO<sub>2</sub> and PM<sub>2.5</sub>, with regular exceedances of the NAAQS for SO<sub>2</sub> and occasional exceedances of the NAAQS for PM<sub>2.5</sub>. The EPA considers the volcano a natural, uncontrollable event and therefore the state is requesting exclusion of these NAAQS exceedances from attainment/non-attainment determination.

Excluding the exceedances due to the volcano, in 2012 the State of Hawaii was in attainment of all NAAQS.

### **Explanation of Summary Tables 4-1 through 4-15:**

- Summaries are by pollutant and averaging period, with the number of occurrences exceeding the NAAQS or, in Table 4-15, the number of exceedances of the state H<sub>2</sub>S standard (there is no federal H<sub>2</sub>S standard);
- The "Maximum" is the highest and second highest valid values recorded in the year for the averaging period. For PM<sub>2.5</sub>, the maximum and 98<sup>th</sup> percentile concentrations are provided and for O<sub>3</sub>, the 4<sup>th</sup> highest daily maximum value is also displayed;
- The "Annual Mean" is the arithmetic mean of all valid values recorded in the year;
- "Possible Periods" is the total number of possible sampling periods in the year for the averaging period;
- "Valid Periods" is the total number of acceptable sampling periods after data validation;
- "Percent Recovery" represents the amount of quality data reported;
- Attainment with the NAAQS is determined according to 40 CFR 50.

### **Explanation of Tables 4-16 through 4-25:**

- For each pollutant and averaging period, the highest concentration for each month is presented;
- The month with the highest value recorded in the year for each site is highlighted.

**Table 4-1. 2012 Summary of the 24-Hour PM<sub>10</sub> Averages**

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 150 µg/m <sup>3</sup>												Possible Periods	Valid Periods	Percent Recovery	
	1 <sup>st</sup> High	2 <sup>nd</sup> High		All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov				Dec
<b>OAHU</b>																			
Honolulu	32	28	11.7	0	0	0	0	0	0	0	0	0	0	0	0	0	366	355	97.0
Kapolei	40	36	15.6	0	0	0	0	0	0	0	0	0	0	0	0	0	366	352	96.2
Pearl City	37	33	17.9	0	0	0	0	0	0	0	0	0	0	0	0	0	366	362	98.9

**Table 4-2. Attainment Determination of the 24-Hour PM<sub>10</sub> NAAQS**

Station	Exceedances in 2010	Exceedances in 2011	Exceedances in 2012	Sites in violation of the NAAQS
Honolulu	0	0	0	0
Kapolei	0	0	0	0
Pearl City	0	0	0	0

Attainment: The standard not to be exceeded more than once per year on average over 3 years.  
**In 2012, Hawaii was in attainment with the 24-hour PM<sub>10</sub> NAAQS.**

**Table 4-3. 2012 Summary of the 24-Hour PM<sub>2.5</sub> Averages: SLAMS Stations**

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 35 µg/m <sup>3</sup>												Possible Periods	Valid Periods	Percent Recovery	
	1 <sup>st</sup> High	98 <sup>th</sup> %	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
<b>OAHU</b>																			
Honolulu	16.9	12.8	5.1	0	0	0	0	0	0	0	0	0	0	0	0	0	366	342	93.4
Kapolei	23.5	14.8	7.1	0	0	0	0	0	0	0	0	0	0	0	0	0	366	355	97.0
Pearl City	20.1	13.4	6.3	0	0	0	0	0	0	0	0	0	0	0	0	0	366	347	94.8
Sand Island	23.2	13.1	6.2	0	0	0	0	0	0	0	0	0	0	0	0	0	366	312	85.2
<b>MAUI</b>																			
Kihei	18.4	14.4	6.4	0	0	0	0	0	0	0	0	0	0	0	0	0	366	337	92.1

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**Table 4-4. Attainment Determination of the 24-Hour PM<sub>2.5</sub> NAAQS: SLAMS Stations**

Station	2010 98 <sup>th</sup> value	2011 98 <sup>th</sup> value	2012 98 <sup>th</sup> value	3-Year Average	Sites in violation of the NAAQS
Honolulu	12	9	13	11	0
Kapolei	12	13	15	13	0
Pearl City	13	10	13	12	0
Sand Island	17	20	13	17	0
Kihei	14	13	14	14	0

Attainment: The 3-year average of the 98<sup>th</sup> percentile values must be less than or equal to 35 µg/m<sup>3</sup>.  
**In 2012, Hawaii was in attainment with the 24-hour PM<sub>2.5</sub> NAAQS.**

**Table 4-5. Attainment Determination of the Annual PM<sub>2.5</sub> NAAQS: SLAMS Stations**

Station	2010 Ann. Avg.	2011 Ann. Avg.	2012 Ann. Avg.	3-Year Average	Sites in violation of the NAAQS
Honolulu	4.7	4.7	5.1	4.8	0
Kapolei	4.3	5.3	7.1	5.6	0
Pearl City	4.4	5.0	6.3	5.2	0
Sand Island	10.0	9.1	6.2	8.4	0
Kihei	4.8	5.9	6.4	5.7	0

Attainment: The 3-year average of annual mean values must be less than 15 µg/m<sup>3</sup>.  
**In 2012, Hawaii was in attainment with the annual PM<sub>2.5</sub> NAAQS.**

**Table 4-6. 2012 Summary of the 24-Hour PM<sub>2.5</sub> Averages: SPM Stations**

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 35 µg/m <sup>3</sup>												Possible Periods	Valid Periods	Percent Recovery
	1 <sup>st</sup> High	98 <sup>th</sup> %	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
<b>HAWAII</b>																		
Hilo	21.8	15.9	5.3	0	0	0	0	0	0	0	0	0	0	0	0	366	332	90.7
Kona	32.3	27.5	16.2	0	0	0	0	0	0	0	0	0	0	0	0	366	350	95.6
Mt. View	22.8	17.9	5.3	0	0	0	0	0	0	0	0	0	0	0	0	366	313	85.5
Ocean View	32.2	23.1	12.9	0	0	0	0	0	0	0	0	0	0	0	0	366	360	98.4
Pahala	96.7 <sup>1</sup>	16.0	7.5	0	0	0	0	0	2	0	0	0	0	0	0	366	356	97.5
Waikoloa	22.2	19.5	8.7 <sup>2</sup>	-	-	-	-	-	-	0	0	0	0	0	0	184 <sup>3</sup>	183	99.5
<b>KAUAI</b>																		
Niumalu	16.2 <sup>4</sup>	13.5	6.8	-	-	-	0	0	0	0	0	0	0	0	0	366	346	94.5

The special purpose stations on Hawaii island were established to monitor ambient air concentrations of PM<sub>2.5</sub> from volcanic emissions. The special purpose station on Kauai was established to monitor emissions from cruise ships.

<sup>1</sup> Due to brushfires near the station  
<sup>2</sup> Does not meet summary criteria, <75% data recovery in year  
<sup>3</sup> Station began 7/1/2012, incomplete year  
<sup>4</sup> New Year's fireworks

**Table 4-7. 2012 Summary of the 8-Hour O<sub>3</sub> Averages**

	Maximum			Annual Mean	No. of Daily Maximum 8-Hour Averages Greater than 0.075 ppm												Possible Periods	Valid Periods	Percent Recovery	
	1 <sup>st</sup> High	2 <sup>nd</sup> High	4 <sup>th</sup> High		All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov				Dec
<b>OAHU</b>																				
Sand Island	0.045	0.044	0.044	0.023	0	0	0	0	0	0	0	0	0	0	0	0	0	8779	8094	92.2

**Table 4-8. Attainment Determination of the 8-Hour O<sub>3</sub> NAAQS**

Station	2010 4 <sup>th</sup> highest	2011 4 <sup>th</sup> highest	2012 4 <sup>th</sup> highest	3-Year Average	Site in violation of the NAAQS
Sand Island	0.047	0.046	0.044	0.046	0
Attainment: The 3-year average of the annual 4 <sup>th</sup> highest daily maximum 8-hour average must be less than or equal to 0.075 ppm. <b>In 2012, Hawaii was in attainment with the 8-hour O<sub>3</sub> NAAQS.</b>					

**Table 4-9. 2012 Summary of the 1-Hour and Annual NO<sub>2</sub> Averages**

	Maximum 1-hr		Annual Mean	No. of Daily Maximum 1-Hour Averages Greater than 0.100 ppm												Possible Periods	Valid Periods	Percent Recovery		
	1 <sup>st</sup> High	2 <sup>nd</sup> High		All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov				Dec	
<b>OAHU</b>	<b>SLAMS stations</b>																			
Kapolei	0.027	0.023	0.003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8784	8190	93.2
<b>KAUAI</b>	<b>SPM Station</b>																			
Niumalu	0.042	0.039	0.003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8784	7430	84.6
Attainment of the annual NO <sub>2</sub> NAAQS: The annual mean shall not exceed 0.053 ppm. <b>In 2012, Hawaii was in attainment with the annual NO<sub>2</sub> NAAQS.</b>																				

**Table 4-10. 2012 Summary of the 1-Hour CO Averages**

	Maximum		Annual Mean	No. of 1-hour Averages Greater than 35 ppm												Possible Periods	Valid Periods	Percent Recovery
	1 <sup>st</sup> High	2 <sup>nd</sup> High		All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov			
<b>OAHU</b>	<b>SLAMS stations</b>																	
Honolulu	1.0	1.0	0.4	0	0	0	0	0	0	0	0	0	0	0	0	8784	8508	96.9
Kapolei	1.5	1.3	0.7	0	0	0	0	0	0	0	0	0	0	0	0	8784	8613	98.1
<b>KAUAI</b>	<b>SPM Station</b>																	
Niualu	1.2	1.2	0.5	0	0	0	0	0	0	0	0	0	0	0	0	8784	7570	86.2
Attainment: 1-hour values not to exceed 35 ppm more than once per year. <b>In 2012, Hawaii was in attainment with the 1-hour CO NAAQS.</b>																		

**Table 4-11. 2012 Summary of the 8-Hour CO Averages**

	Maximum		Annual Mean	No. of 8-hour Averages Greater than 9 ppm												Possible Periods	Valid Periods	Percent Recovery
	1 <sup>st</sup> High	2 <sup>nd</sup> High		All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov			
<b>OAHU</b>	<b>SLAMS stations</b>																	
Honolulu	0.7	0.7	0.4	0	0	0	0	0	0	0	0	0	0	0	0	8755	8629	98.6
Kapolei	1.1	1.1	0.7	0	0	0	0	0	0	0	0	0	0	0	0	8755	8610	98.3
<b>KAUAI</b>	<b>SPM Station</b>																	
Niualu	1.0	0.9	0.5	0	0	0	0	0	0	0	0	0	0	0	0	8779	7545	85.9
Attainment: 8-hour values not to exceed 9 ppm more than once per year. <b>In 2012, Hawaii was in attainment with the 8-hour CO NAAQS.</b>																		

**Table 4-12. 2012 Summary of the 1-Hour SO<sub>2</sub> Averages**

	Maximum		Annual Mean	No. of 1-hour Averages Greater than 0.075 ppm												Possible Periods	Valid Periods	Percent Recovery
	1 <sup>st</sup> High	2 <sup>nd</sup> High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
<b>OAHU</b>	<b>SLAMS Stations</b>																	
Honolulu	0.031	0.028	0.001	0	0	0	0	0	0	0	0	0	0	0	0	8784	8483	96.6
Kapolei	0.012	0.009	0.002	0	0	0	0	0	0	0	0	0	0	0	0	8784	8388	95.5
<b>HAWAII</b>	<b>SPM Stations (see NOTE)</b>																	
Hilo	0.327	0.258	0.003	7	2	2	0	0	0	0	0	0	2	3	4	8784	8607	98.0
Kona	0.106	0.098	0.005	1	1	0	0	0	0	0	0	0	0	0	0	8784	8273	94.2
Mt. View	0.496	0.465	0.003	6	3	1	0	0	0	0	0	1	3	3	3	8784	8543	97.3
Ocean View	1.000	1.000	0.023	15	21	21	15	19	14	12	8	15	9	11	17	8784	8555	97.4
Pahala	1.000	1.000	0.052	21	23	29	26	27	24	27	20	25	21	26	24	8784	8614	98.1
Puna E	0.015	0.015	0.002	0	0	0	0	0	0	0	0	0	0	0	0	8784	8453	96.2
Waikoloa	0.036	0.032	0.001 <sup>1</sup>	-	-	-	-	-	-	0	0	0	0	0	0	4416 <sup>2</sup>	4194	95.0
<b>KAUAI</b>	<b>SPM Station</b>																	
Niumalu	0.090	0.075	0.002	0	0	0	1	0	0	0	0	0	0	0	0	8784	7825	89.1
<p>Attainment: The 3-year average of the 99<sup>th</sup> percentile values must be less than or equal to 0.075 ppm. Effective June 2, 2010.  <b>In 2012, Hawaii was in attainment with the 1-hour SO<sub>2</sub> NAAQS (SLAMS stations only).</b></p> <p>NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Although Hilo and Kona stations are designated SLAMS, the values are still mostly attributed to volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 1-hour NAAQS from attainment determinations. The SPM station on Kauai was established to monitor emissions from cruise ships.</p> <p><sup>1</sup> Does not meet summary criteria, &lt;75% data recovery in year    <sup>2</sup> Station began 7/1/2012, incomplete year</p>																		

**Table 4-13. 2012 Summary of the 3-Hour SO<sub>2</sub> Averages**

	Maximum		Annual Mean	No. of 3-hour Averages Greater than 0.5 ppm												Possible Periods	Valid Periods	Percent Recovery
	1 <sup>st</sup> High	2 <sup>nd</sup> High		All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov			
<b>OAHU</b>	<b>SLAMS stations</b>																	
Honolulu	0.026	0.021	0.001	0	0	0	0	0	0	0	0	0	0	0	0	2928	2708	92.5
Kapolei	0.007	0.006	0.002	0	0	0	0	0	0	0	0	0	0	0	0	2928	2704	92.3
<b>HAWAII</b>	<b>SPM stations (see NOTE)</b>																	
Hilo	0.237	0.235	0.003	0	0	0	0	0	0	0	0	0	0	0	0	2928	2755	94.1
Kona	0.089	0.079	0.005	0	0	0	0	0	0	0	0	0	0	0	0	2928	2672	91.3
Mt. View	0.284	0.263	0.003	0	0	0	0	0	0	0	0	0	0	0	0	2928	2765	94.4
Ocean View	0.543	0.474	0.023	0	0	0	0	0	0	0	0	0	0	0	0	2928	2758	94.2
Pahala	0.782	0.763	0.052	5	0	0	0	0	0	0	0	0	1	0	0	2928	2791	95.3
Puna E	0.014	0.012	0.002	0	0	0	0	0	0	0	0	0	0	0	0	2928	2724	93.0
Waikoloa	0.025	0.025	0.001 <sup>1</sup>	-	-	-	-	-	-	0	0	0	0	0	0	1472 <sup>2</sup>	1360	92.4
<b>KAUAI</b>	<b>SPM station</b>																	
Niimalu	0.057	0.051	0.002	0	0	0	0	0	0	0	0	0	0	0	0	2928	2541	86.8

Attainment: 3-hour values not to exceed 0.5 ppm more than once per year.

**In 2012, Hawaii was in attainment with the 3-hour SO<sub>2</sub> NAAQS (SLAMS stations only).**

NOTE: The SPM stations on Hawaii island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Although Hilo and Kona stations are designated SLAMS, the values are still mostly attributed to volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 3-hour NAAQS from attainment determinations.

<sup>1</sup> Does not meet summary criteria, <75% data recovery in year    <sup>2</sup> Station began 7/1/2012, incomplete year

**Table 4-14. 2012 Summary of the 24-Hour and Annual SO<sub>2</sub> Averages**

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 0.140 ppm												Possible Periods	Valid Periods	Percent Recovery
	1 <sup>st</sup> High	2 <sup>nd</sup> High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
<b>OAHU</b>	<b>SLAMS Stations</b>																	
Honolulu	0.009	0.005	0.001	0	0	0	0	0	0	0	0	0	0	0	0	366	360	98.4
Kapolei	0.004	0.004	0.002	0	0	0	0	0	0	0	0	0	0	0	0	366	354	96.7
<b>HAWAII</b>	<b>SPM Stations (see NOTE)</b>																	
Hilo	0.064	0.062	0.003	0	0	0	0	0	0	0	0	0	0	0	0	366	365	99.7
Kona	0.030	0.030	0.005	0	0	0	0	0	0	0	0	0	0	0	0	366	346	94.5
Mt. View	0.102	0.071	0.003	0	0	0	0	0	0	0	0	0	0	0	0	366	359	98.1
Ocean View	0.142	0.138	0.023	0	0	0	0	0	0	0	0	0	0	0	0	366	362	98.9
Pahala	0.295	0.232	0.052	5	0	0	0	0	0	0	0	0	2	0	0	366	362	98.9
Puna E	0.006	0.004	0.002	0	0	0	0	0	0	0	0	0	0	0	0	366	358	97.8
Waikoloa	0.025	0.025	0.001 <sup>1</sup>	-	-	-	-	-	-	0	0	0	0	0	0	184 <sup>2</sup>	177	96.2
<b>KAUAI</b>	<b>SPM Station</b>																	
Niumalu	0.055	0.055	0.002	-	-	-	0	0	0	0	0	0	0	0	0	366	269	97.8
<p>Attainment: 24-hour values not to exceed 0.14 ppm more than once per year.  <b>In 2012, Hawaii was in attainment with the 24-hour SO<sub>2</sub> NAAQS (SLAMS stations only).</b></p> <p>NOTE: The SPM stations were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Although Hilo and Kona stations are designated SLAMS, the values are still mostly attributed to volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 24-hour NAAQS from attainment determinations.</p>																		
<p>Attainment: Annual average (from SLAMS stations only) not to exceed 0.03 ppm.  <b>In 2012, Hawaii was in attainment with the annual SO<sub>2</sub> NAAQS.</b></p> <p>NOTE: The SPM stations were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Although Hilo and Kona stations are designated SLAMS, the values are still mostly attributed to volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the annual NAAQS from attainment determinations.</p> <p><sup>1</sup> Does not meet summary criteria, &lt;75% data recovery in year    <sup>2</sup> Station began 7/1/2012, incomplete year</p>																		

**Table 4-15. 2012 Summary of the 1-Hour H<sub>2</sub>S Averages (State Standard)**

	Maximum		Annual Mean	No. of 1-hour Averages Greater than 0.025 ppm												Possible Periods	Valid Periods	Percent Recovery	
	1 <sup>st</sup> High	2 <sup>nd</sup> High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
<b>HAWAII</b>																			
Puna E	0.004	0.004	0.001	0	0	0	0	0	0	0	0	0	0	0	0	0	8784	8453	96.2

Attainment of the state standard: 1-hour values not to exceed 0.025 ppm.  
**In 2012, Hawaii was in attainment of the state 1-hour H<sub>2</sub>S standard.**

**Table 4-16. 2012 Monthly Maximum of 24-Hour PM<sub>10</sub> Values (µg/m<sup>3</sup>)**

The month with the highest value in the year is highlighted

The state and federal 24-hr PM<sub>10</sub> standard is 150 µg/m<sup>3</sup>

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Honolulu	32	22	28	21	28	27	19	14	9	19	14	24
Kapolei	34	33	30	28	40	30	21	36	25	36	2	26
Pearl City	31	33	33	27	33	37	24	24	18	28	26	32

**Table 4-17. 2012 Monthly Maximum of 24-Hour PM<sub>2.5</sub> Values (µg/m<sup>3</sup>)**

The month with the highest value in the year is highlighted

The federal 24-hr PM<sub>2.5</sub> standard is 35 µg/m<sup>3</sup>

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>SLAMS Stations</b>												
Honolulu	15	12	9	9	13	10	8	6	6	15	12	17
Kapolei	24	15	16	15	15	12	14	10	10	14	13	18
Pearl City	17	10	13	14	13	10	13	8	6	16	13	20
Sand Island	23	16	12	13	13	12	12	7	7	15	11	16
Kihei	17	10	14	11	14	18	12	17	8	16	15	14
<b>SPM Stations</b>												
Niumalu (cruise ships)	16 <sup>1</sup>	10	14	14	12	14	14	11	7	14	13	13
Hilo (volcano)	22	22	8	11	9	6	6	10	6	16	13	21
Kona (volcano)	23	26	29	32	27	22	25	22	17	19	19	24
Mt. View (volcano)	22	23	10	12	13	17	5	10	8	22	16	15
Ocean View (volcano)	21	21	28	32	23	21	20	18	16	18	18	19
Pahala (volcano)	21	17	15	15	16	97 <sup>2</sup>	9	12	8	14	14	14
Waikoloa <sup>3</sup> (volcano)	station not established	11	15	16	22	17	20					

<sup>1</sup> Occurred during New Year's fireworks celebration on January 1

<sup>2</sup> Occurred during multiple brush fires near the Pahala station on June 18; exceptional event documentation has been submitted to EPA for the exceedance

<sup>3</sup> Waikoloa station began July 1, 2012

**Table 4-18. 2012 Monthly Maximum of 1-Hour NO<sub>2</sub> Values (ppm)**

The month with the highest value in the year is highlighted

The federal 1-hour standard for NO<sub>2</sub> is 0.100 ppm

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kapolei	0.019	0.020	0.027	0.015	0.022	0.011	0.011	0.011	0.017	0.018	0.023	0.019
Niualu	0.018	0.034	0.036	0.042	0.036	0.030	0.026	0.025	0.019	0.014	0.032	0.031

**Table 4-19. 2012 Monthly Maximum of 1-Hour CO Values (ppm)**

The month with the highest value in the year is highlighted

The federal 1-hr CO standard is 35 ppm, the state standard is 9 ppm

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Honolulu	0.7	1.0	0.8	0.8	0.8	0.8	0.4	0.4	0.9	0.7	0.8	1.0
Kapolei	1.3	1.3	1.0	1.1	1.0	1.1	0.9	1.1	0.6	0.9	1.5	1.1
Niualu	0.6	0.8	1.2	0.7	1.2	0.7	0.8	0.8	0.6	1.2	1	0.6

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**Table 4-20. 2012 Monthly Maximum of 8-Hour CO Values (ppm)**

The month with the highest value in the year is highlighted

The federal 8-hr CO standard is 9 ppm, the state standard is 4.4 ppm

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Honolulu	0.4	0.6	0.5	0.6	0.6	0.7	0.3	0.3	0.5	0.6	0.5	0.5
Kapolei	1.0	0.9	0.9	1.0	0.9	1.0	1.0	1.1	0.5	0.6	0.9	0.9
Niualu	0.5	0.8	0.7	0.7	0.8	0.7	0.8	0.7	0.5	0.9	1.0	0.6

**Table 4-21. 2012 Monthly Maximum of 8-Hour O<sub>3</sub> Values (ppm)**

The month with the highest value in the year is highlighted

The federal 8-hr O<sub>3</sub> standard is 0.075 ppm

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sand Island	0.032	0.038	0.044	0.045	0.041	0.035	0.031	0.029	0.027	0.033	0.042	0.041

**Table 4-22. 2012 Monthly Maximum of 1-Hour SO<sub>2</sub> Values (ppm)**

The month with the highest value in the year is highlighted

The federal 1-hr SO<sub>2</sub> standard is 0.075 ppm (75 ppb)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>SLAMS Stations</b>												
Honolulu	0.016	0.031	0.003	0.001	0.003	0.001	0.001	0.002	0.002	0.004	0.007	0.004
Kapolei	0.009	0.012	0.001	0.001	0.003	0.002	0.002	0.003	0.003	0.007	0.003	0.005
<b>SPM Stations (see NOTE)</b>												
Niualalu (cruise ships)	0.039	0.040	0.037	0.090	0.075	0.031	0.032	0.015	0.018	0.016	0.016	0.011
Hilo (volcano)	0.327	0.194	0.224	0.011	0.016	0.005	0.008	0.011	0.049	0.224	0.258	0.227
Kona (volcano)	0.106	0.098	0.073	0.064	0.025	0.046	0.027	0.027	0.032	0.026	0.059	0.039
Mt. View (volcano)	0.465	0.174	0.211	0.010	0.006	0.007	0.010	0.008	0.126	0.280	0.496	0.126
Ocean View (volcano)	0.699	1.000	1.000	1.000	0.438	0.339	0.362	0.159	0.357	0.207	0.452	0.566
Pahala (volcano)	1.000	0.868	0.777	0.318	0.516	0.681	0.664	0.423	0.935	0.673	0.818	0.552
Puna E (volcano)	0.015	0.015	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.004	0.003	0.007
Waikoloa <sup>1</sup> (volcano)	station not established	0.002	0.002	0.002	0.002	0.014						

NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Although Hilo and Kona stations are designated SLAMS, the values are still mostly attributed to volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 1-hour NAAQS from attainment determinations.

<sup>1</sup> Waikoloa station began July 1, 2012

**Table 4-23. 2012 Monthly Maximum of 3-Hour SO<sub>2</sub> Values (ppm)**

The month with the highest value in the year is highlighted

The state and federal 3-hr SO<sub>2</sub> standard is 0.5 ppm

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>SLAMS Stations</b>												
Honolulu	0.008	0.026	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.007	0.002
Kapolei	0.006	0.007	0.001	0.001	0.003	0.002	0.002	0.002	0.003	0.004	0.002	0.003
<b>SPM Stations (see NOTE)</b>												
Niualalu (cruise ships)	0.026	0.030	0.029	0.051	0.057	0.023	0.022	0.014	0.014	0.010	0.013	0.009
Hilo (volcano)	0.237	0.139	0.134	0.007	0.010	0.004	0.004	0.008	0.022	0.195	0.235	0.205
Kona (volcano)	0.089	0.079	0.036	0.046	0.021	0.030	0.024	0.022	0.028	0.023	0.055	0.029
Mt. View (volcano)	0.185	0.134	0.163	0.007	0.003	0.003	0.005	0.005	0.056	0.263	0.284	0.101
Ocean View (volcano)	0.387	0.630	0.565	0.422	0.156	0.147	0.224	0.122	0.158	0.150	0.266	0.271
Pahala (volcano)	0.960	0.340	0.475	0.262	0.329	0.393	0.541	0.294	0.481	0.589	0.510	0.399
Puna E (volcano)	0.011	0.014	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.003	0.003	0.005
Waikoloa <sup>1</sup> (volcano)	station not established	0.011	0.005	0.007	0.013	0.015	0.025					

NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 3-hour NAAQS from attainment determinations.

<sup>1</sup> Waikoloa station began July 1, 2012

**Table 4-24. 2012 Monthly Maximum of 24-Hour SO<sub>2</sub> Values (ppm)**

The month with the highest value in the year is highlighted

The state and federal 24-hr SO<sub>2</sub> standard is 0.14 ppm

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
<b>SLAMS Stations</b>													
Honolulu	0.003	0.009	0.001	0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.002	0.001	
Kapolei	0.004	0.004	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	
<b>SPM Stations (see NOTE)</b>													
Niualu (cruise ships)	0.011	0.011	0.012	0.020	0.020	0.011	0.011	0.007	0.004	0.003	0.006	0.003	
Hilo (volcano)	0.044	0.030	0.019	0.002	0.002	0.001	0.001	0.002	0.006	0.064	0.058	0.062	
Kona (volcano)	0.030	0.030	0.015	0.018	0.007	0.013	0.013	0.007	0.013	0.009	0.017	0.014	
Mt. View (volcano)	0.102	0.042	0.036	0.002	0.001	0.001	0.002	0.002	0.018	0.055	0.071	0.035	
Ocean View (volcano)	0.116	0.142	0.138	0.135	0.043	0.065	0.078	0.043	0.044	0.041	0.055	0.051	
Pahala (volcano)	0.295	0.143	0.163	0.091	0.142	0.113	0.139	0.097	0.123	0.205	0.135	0.144	
Puna E (volcano)	0.004	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	
Waikoloa <sup>1</sup> (volcano)	station not established	0.004	0.001	0.003	0.007	0.006	0.014						

NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO<sub>2</sub> from volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 24-hour NAAQS from attainment determinations.

<sup>1</sup> Waikoloa station began July 1, 2012

**Table 4-25. 2012 Monthly Maximum of 1-Hour H<sub>2</sub>S Values (ppm)**

The month with the highest value in the year is highlighted

The state H<sub>2</sub>S standard is .025 ppm

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Puna E	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.001	0.002	0.001

## Section 5

# 2012 PM<sub>2.5</sub> SPECIATION DATA

Atmospheric aerosols are solid or liquid particles suspended in air that come directly from a variety of sources (primary) or are formed by chemical reactions (secondary). Primary and secondary particles tend to have long lifetimes in the atmosphere and can travel long distances, up to hundreds or perhaps thousands of miles. Sources include dust from roads, construction, and agriculture; combustion particles from motor vehicles, electric utilities and agricultural burning; and particles from natural sources such as the ocean or volcano.

Most of the PM<sub>2.5</sub> is a combination of the following components: sulfates, nitrates, ammonium, elemental carbon, organic compounds, water and metals. The EPA selected target particulates of interest based on data use objectives, primary constituents of PM<sub>2.5</sub>, and the capability and availability of current analytical methods.

The filter-based speciation sampler collects samples once every 3 days for analyses performed by an EPA contract laboratory. The speciation sampler is located at the Kapolei monitoring station.

Table 5-1 lists the parameters measured, highest and second highest values recorded in the year, the annual arithmetic mean of all valid samples and the total number of samples collected in the year. Table 5-2 lists the analysis methods for each parameter.

With the exception of lead, there are no ambient air quality standards for the individual components of speciated PM<sub>2.5</sub>.

For more information on EPA's speciation program, go to:  
[www.epa.gov/ttn/amtic/speciepg.html](http://www.epa.gov/ttn/amtic/speciepg.html)

**Table 5-1. Annual Summary of PM<sub>2.5</sub> Speciation Data**

Parameter	1 <sup>st</sup> High (µg/m <sup>3</sup> )	2 <sup>nd</sup> High (µg/m <sup>3</sup> )	Annual Mean (µg/m <sup>3</sup> )	No. of Samples	Percent Recovery
<b>CARBON</b>					
Organic Carbon	2.160	0.939	0.3626	104	85
Elemental Carbon	0.272	0.259	0.0832	104	85
<b>METALS</b>					
Aluminum	0.234	0.224	0.0247	110	90
Antimony	0.077	0.068	0.0210	110	90
Arsenic	0.002	0.002	0.0002	110	90
Barium	0.034	0.030	0.0066	110	90
Bromine	0.010	0.008	0.0019	110	90
Cadmium	0.018	0.016	0.0021	110	90
Calcium	0.477	0.416	0.0699	110	90
Cerium	0.044	0.044	0.0060	110	90
Cesium	0.023	0.023	0.0073	110	90
Chlorine	1.610	1.470	0.5803	110	90
Chromium	0.147	0.015	0.0027	110	90
Cobalt	0.002	0.002	0.0007	110	90
Copper	0.027	0.022	0.0016	110	90
Indium	0.037	0.030	0.0105	110	90
Iron	0.600	0.200	0.0360	110	90
Lead	0.005	0.002	0.0003	110	90
Magnesium	0.157	0.141	0.0423	110	90
Manganese	0.008	0.004	0.0005	110	90
Nickel	0.052	0.012	0.0025	110	90
Phosphorus	0.010	0.008	0.0056	110	90
Potassium	0.571	0.165	0.0333	110	90
Rubidium	0.002	0.002	0.0010	110	90
Selenium	0.001	0.001	0.0011	110	90
Silicon	0.615	0.555	0.0538	110	90
Silver	0.019	0.019	0.0090	110	90
Sodium	0.952	0.945	0.4022	110	90
Strontium	0.012	0.006	0.0014	110	90
Sulfur	3.350	3.050	0.3766	110	90
Tin	0.026	0.019	0.0127	110	90
Titanium	0.014	0.012	0.0030	110	90
Vanadium	0.005	0.005	0.0018	110	90
Zinc	0.041	0.017	0.0019	110	90
Zirconium	0.012	0.012	0.0043	110	90

Table 5-1 Continued

Parameter	1 <sup>st</sup> High ( $\mu\text{g}/\text{m}^3$ )	2 <sup>nd</sup> High ( $\mu\text{g}/\text{m}^3$ )	Annual Mean ( $\mu\text{g}/\text{m}^3$ )	No. of Samples	Percent Recovery
<b>IONS</b>					
Ammonium Ion	1.93	1.09	0.104	111	91
Potassium Ion	0.65	0.55	0.023	111	91
Sodium Ion	1.87	1.41	0.480	111	91
Total Nitrate	0.51	0.41	0.192	111	91
Sulfate	9.87	7.86	1.061	111	91

**Table 5-2. Speciation Collection and Analysis Methods**

Parameter	Collection Method	Analysis Method
Carbon	URG 300N Quartz Filter	Thermal Optical Transmittance
Metals	Met-One SASS Teflon Filter	Energy Dispersive X-Ray Fluorescence
Ions	Met-One SASS Nylon Filter	Ion Chromatography

<sup>†</sup> Trademarked equipment: Speciation Air Sampling System

## Section 6

# AMBIENT AIR QUALITY TRENDS

The following graphs illustrate 5-year trends for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, and CO from 2008 to 2012 at all SLAMS stations monitoring for those pollutants. The West Beach SLAMS station was shut down in 2011 and therefore any graphs with the West Beach station will not have any values for 2012.

Figures 6-1 and 6-2 are graphs of the PM<sub>10</sub> annual and maximum 24-hour averages. The maximum 24-hour PM<sub>10</sub> average at West Beach in 2009 was attributed to construction vehicles travelling on the dirt road next to the station.

Figure 6-3 is the graph of the PM<sub>2.5</sub> annual averages. Attainment of the PM<sub>2.5</sub> 24-hour standard is based on the 98<sup>th</sup> percentile value at each station, which is depicted in Figure 6-4.

Figures 6-5 and 6-6 are graphs of the SO<sub>2</sub> annual and maximum 24-hour averages.

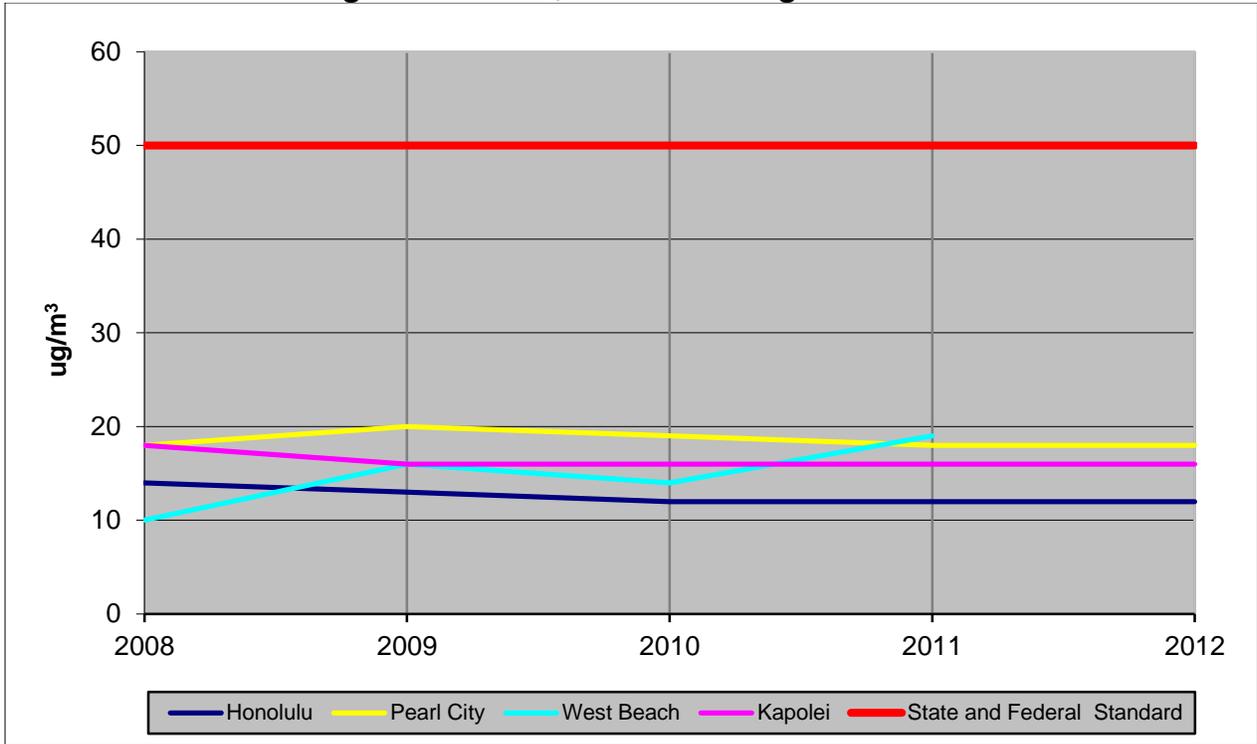
Figure 6-7 and 6-8 shows the annual and maximum 1-hour averages of NO<sub>2</sub> compared to the federal NAAQS.

Attainment of the 8-hour ozone standard is achieved by averaging 3 years of the fourth highest daily maximum 8-hour average concentrations, which must not exceed 0.075 ppm (standard effective May 27, 2008). Figure 6-9 is a graph of the fourth highest daily maximum value recorded at the Sand Island ozone monitoring station in the past five years.

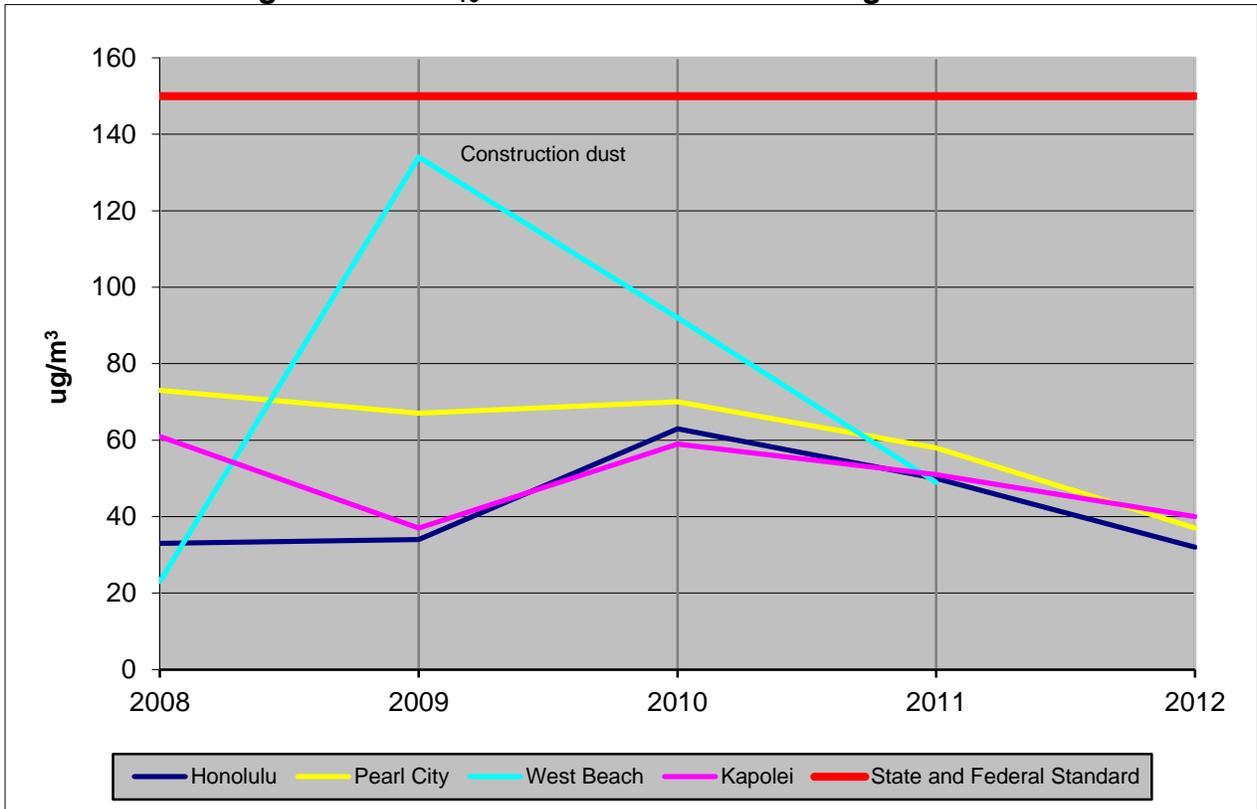
The graphs for 1-hour and 8-hour carbon monoxide (figures 6-10 and 6-11, respectively) represent the maximum 1-hour or 8-hour values recorded in the year.

Criteria pollutant levels remain below state and federal ambient air quality standards at all SLAMS stations in the state.

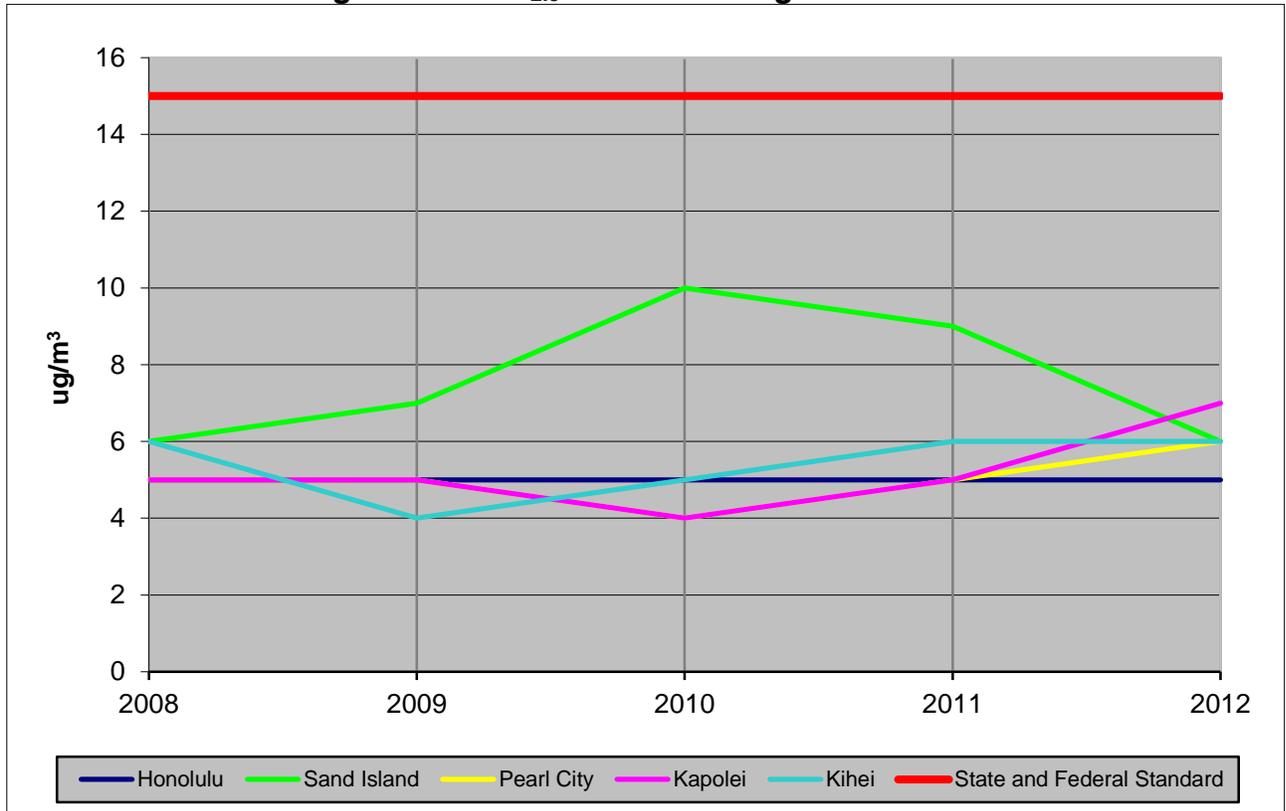
**Figure 6-1. PM<sub>10</sub> Annual Average: 2008-2012**



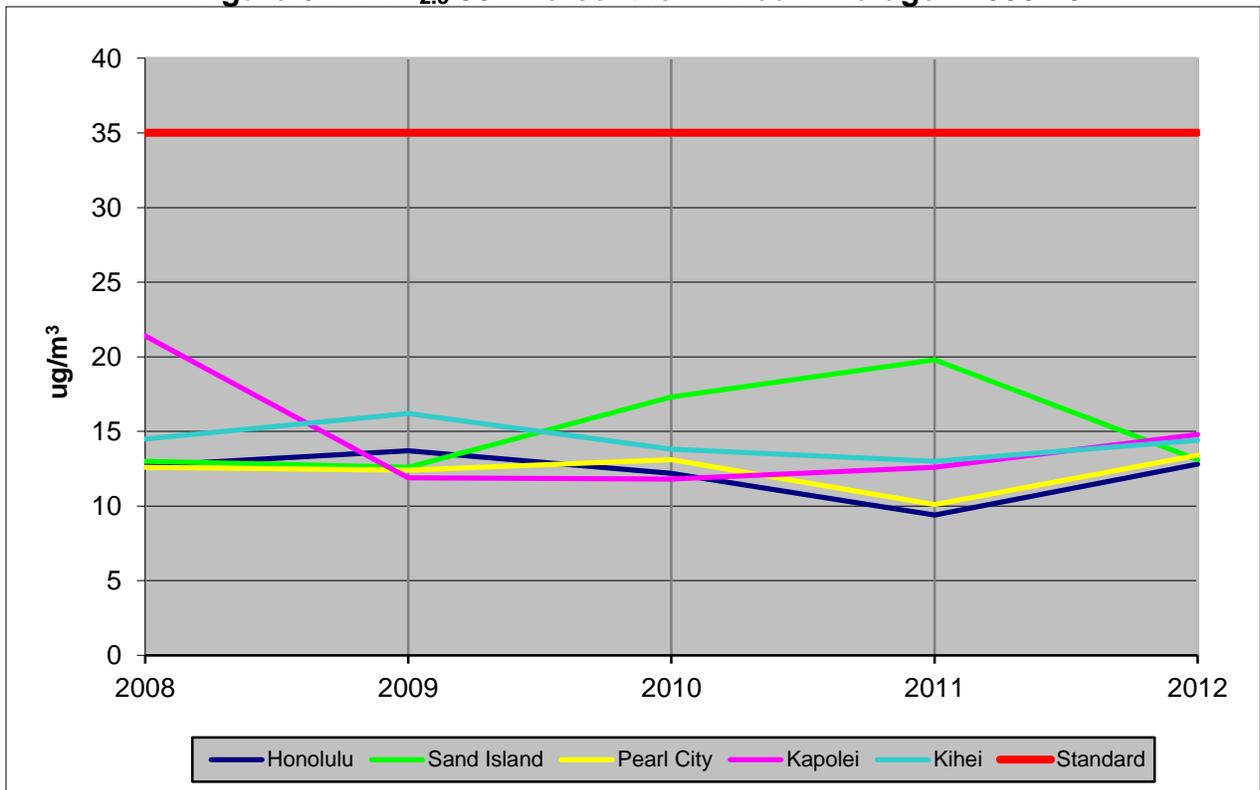
**Figure 6-2. PM<sub>10</sub> Maximum 24-Hour Average: 2008-2012**



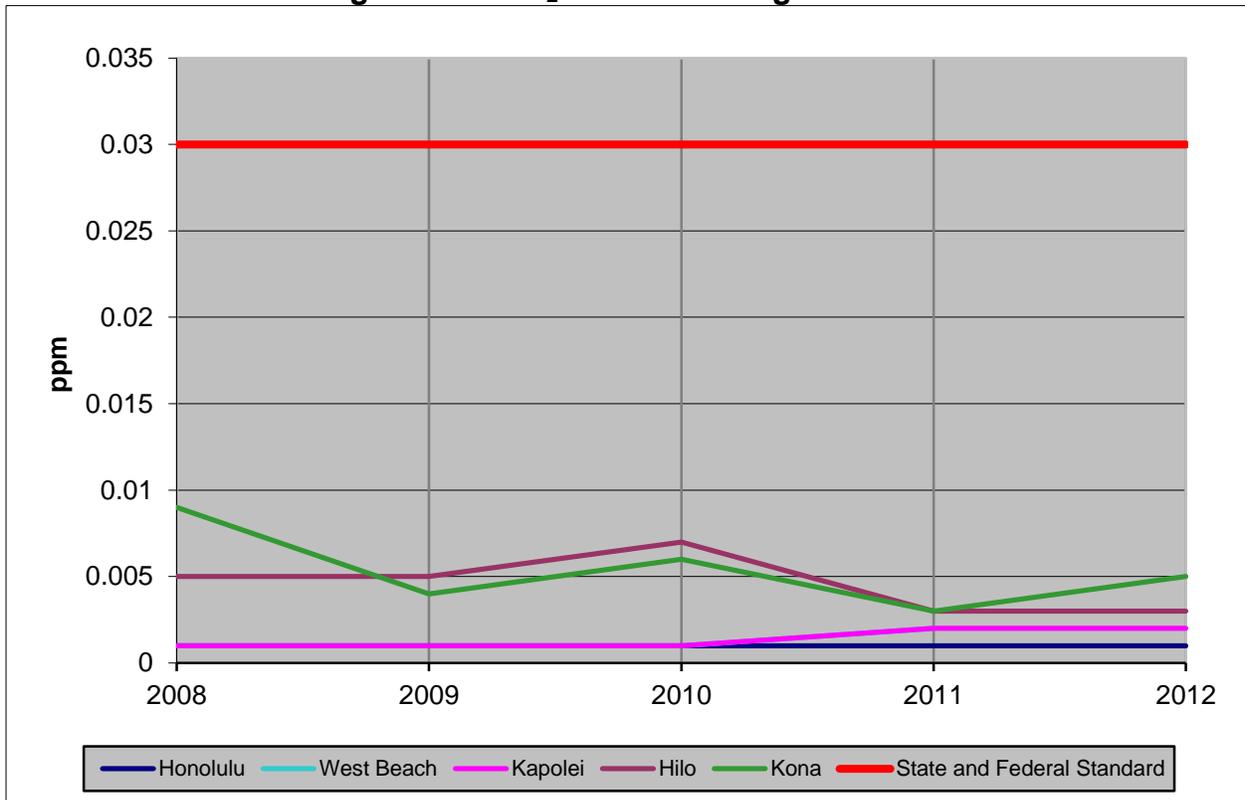
**Figure 6-3. PM<sub>2.5</sub> Annual Average: 2008-2012**



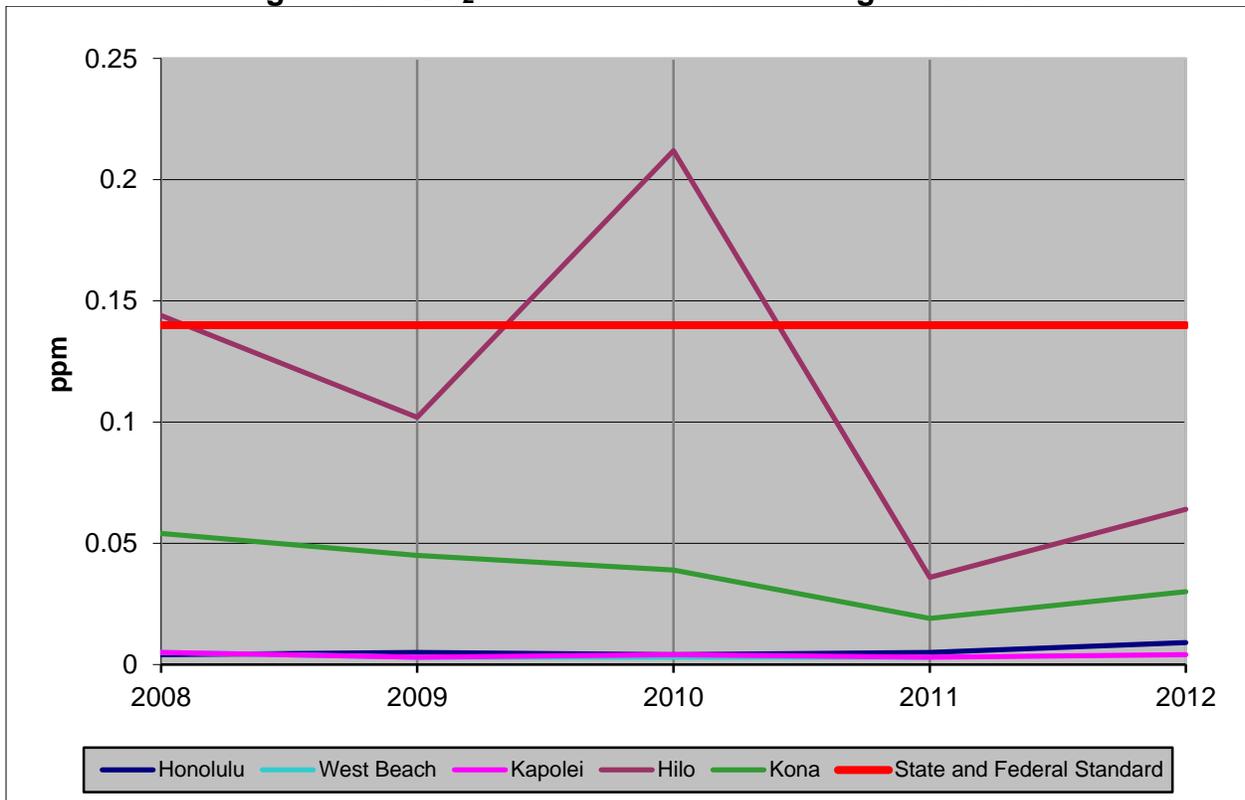
**Figure 6-4. PM<sub>2.5</sub> 98<sup>th</sup> Percentile 24-Hour Average: 2008-2012**



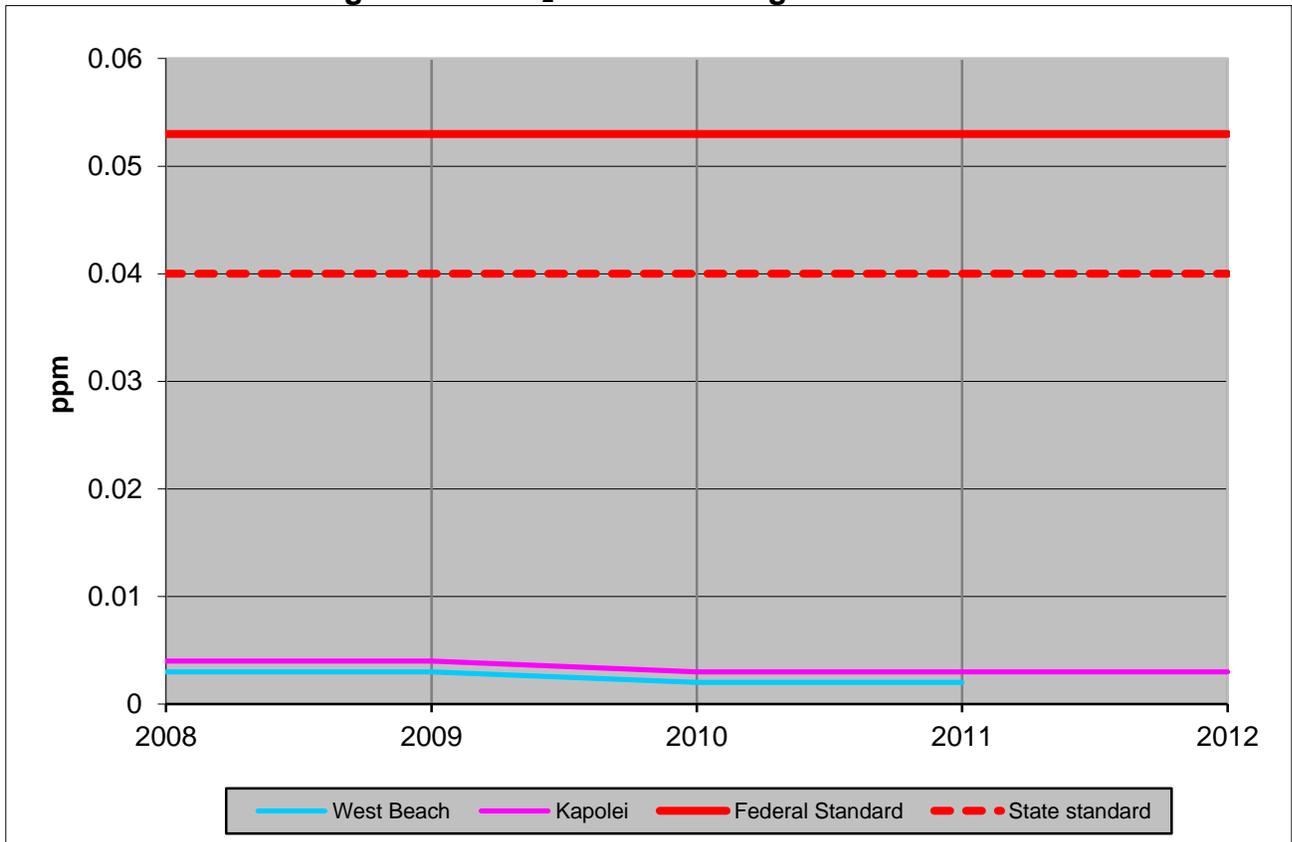
**Figure 6-5. SO<sub>2</sub> Annual Average: 2008-2012**



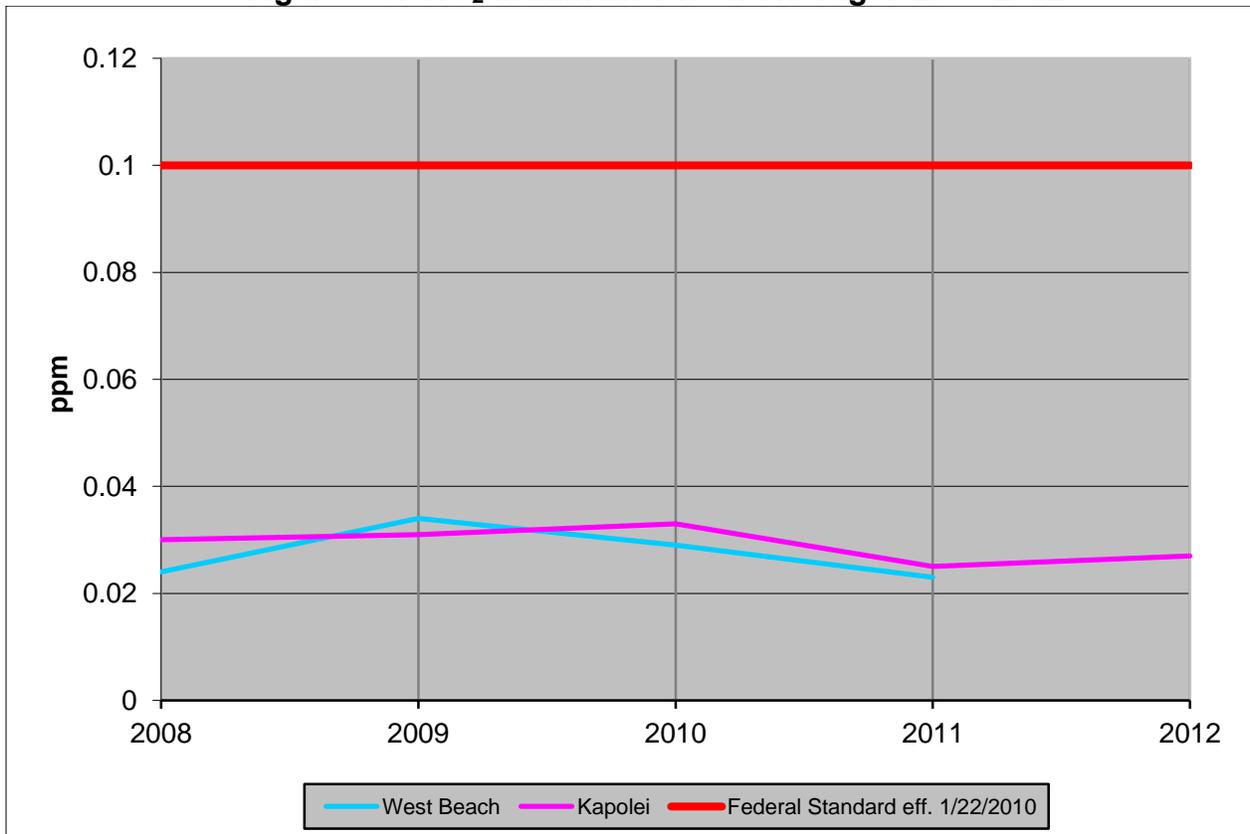
**Figure 6-6. SO<sub>2</sub> Maximum 24-Hour Average: 2008-2012**



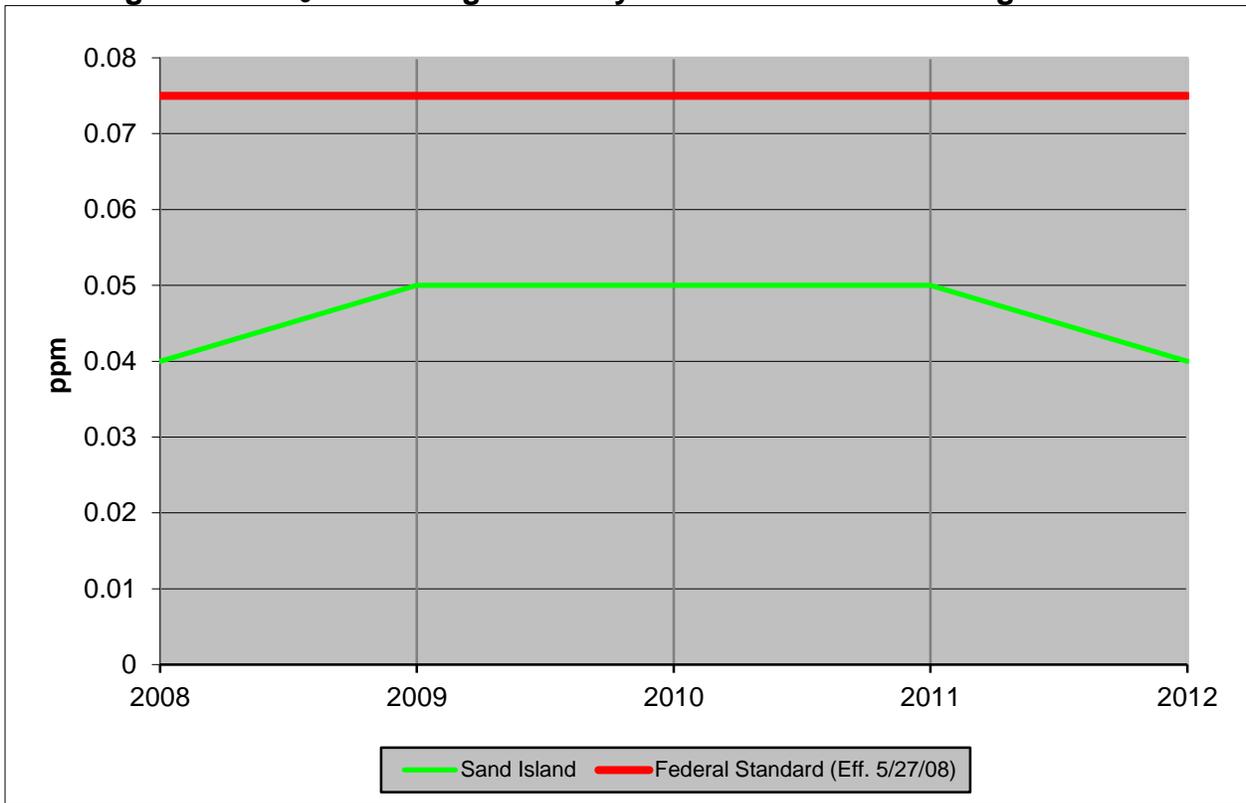
**Figure 6-7. NO<sub>2</sub> Annual Average: 2008-2012**



**Figure 6-8. NO<sub>2</sub> Maximum 1-Hour Average: 2008-2012**



**Figure 6-9. O<sub>3</sub> Fourth Highest Daily Maximum 8-Hour Average: 2008-2012**



**Figure 6-10. CO Maximum 1-Hour Average: 2008-2012**

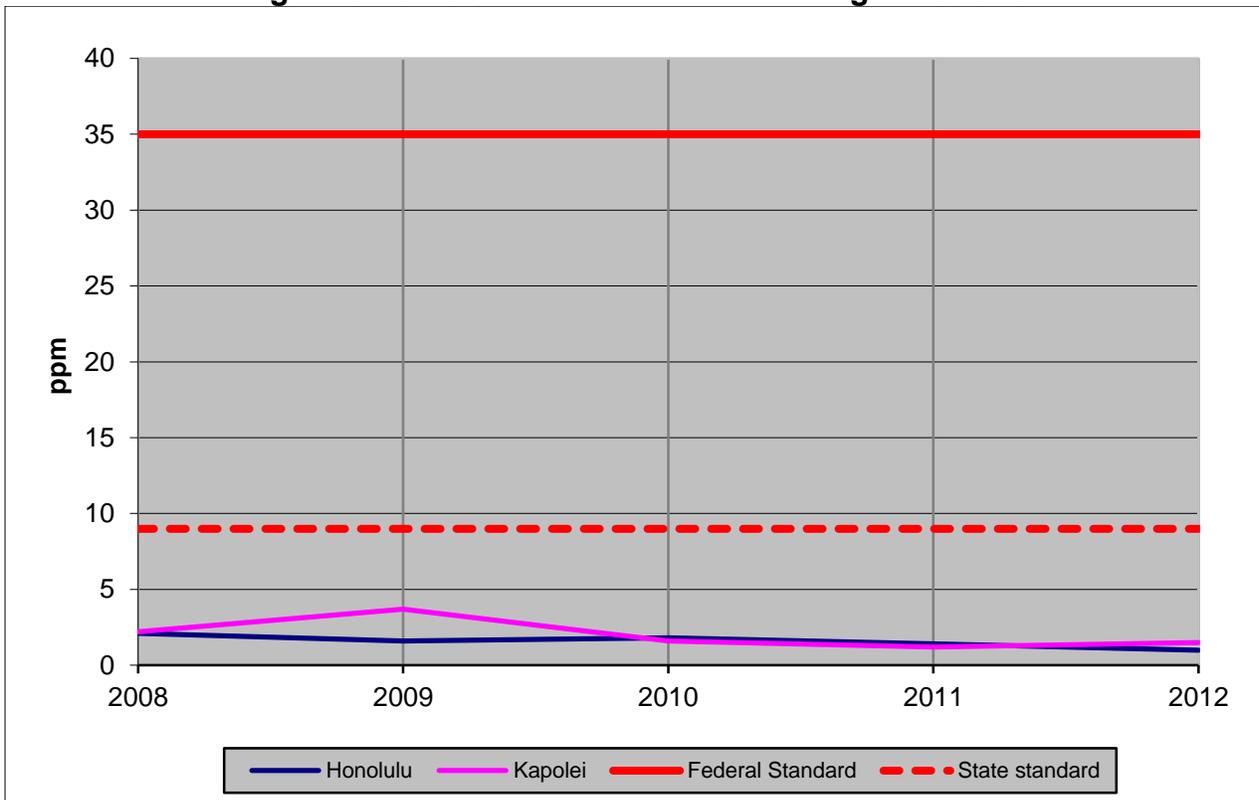


Figure 6-11. CO Maximum 8-Hour Average: 2008-2012

