State of Hawaii
Annual Summary
2011
Air Quality Data

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Department of Health
September 2012

2011
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_{10} and $PM_{2.5}$). 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 $PM_{2.5}$ 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 2011, 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 5 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 2011. 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 2011 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 www.hawaii.gov/health/environmental/air/cab/index.html 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_2 data from stations located on the island. It provides near real-time 15-minute SO_2 averages and advisory level guidance to help individuals protect themselves against possible health effects. To view this data online, go to www.hiso2index.info

To view this entire book as well as books from 2009 and 2010 online, go to: www.hawaii.gov/health/environmental/air/cab/index.html 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 islets Moku Ho'oniki and Kanaha from Murphy's Beach on the island of Molokai.

Section 2
DEFINITIONS

98th Percentile Value	The $PM_{2.5}$ 24-hour average or the maximum daily 1-hour NO_2 average in the year below which 98% of all values fall.
99th Percentile Value	The maximum daily 1-hour SO_2 value in the year below which 99% of all values fall.
Ambient Air	The general outdoor atmosphere, external to buildings, to which the general public has access.
Ambient Air Quality Standard	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.
Carbon Monoxide	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.
CFR	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.
Collocated	This is a procedure required for a certain percentage of PM_{10} and $PM_{2.5}$ samplers in the monitoring network. Collocated samplers determine precision or variation in the PM_{10} or $PM_{2.5}$ concentration measurements of identical samplers run in the same location under the same sampling conditions.
Criteria Pollutants	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_{10} and $PM_{2.5}$).
EPA	The U. S. Environmental Protection Agency; established to protect human health and the natural environment.

Hydrogen Sulfide	Hydrogen sulfide (H_2S) 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.
Micron	One micron is one millionth of a meter or approximately 1/25,000 of an inch.
µg/m^3	Micrograms per cubic meter. This is the measurement of air quality expressed as mass per unit volume.
ng/m^3	Nanograms per cubic meter. One nanogram is one-billionth of a gram, expressed as mass per unit volume.
NAAQS	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_{10}, $PM_{2.5}$, ozone, sulfur dioxide, and lead. These are commonly referred to as criteria pollutants.
Nitrogen Dioxide	Nitrogen dioxide (NO_2) is a brownish, highly corrosive gas with a pungent odor. It is formed in the atmosphere from emissions of nitrogen oxides (NO_x). Sources of nitrogen oxides include electric utilities, industrial boilers, motor vehicle exhaust and combustion of fossil fuels. NO_2 is also a component in the atmospheric reaction that produces ground-level ozone.
Ozone	Ozone (O_3) is the main constituent in photochemical air pollution. It is formed in the atmosphere by a chemical reaction of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight. In the upper atmosphere, O_3 shields the earth from harmful ultraviolet radiation; however, at ground level, it can cause harmful effects in humans and plants.
Particulate Matter	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.

PM_{10}	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.
$PM_{2.5}$	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.
ppbC	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.
ppm	Parts per million is one particle in 1,000,000 other particles. It is approximately one drop in 13 gallons.
SLAMS	State and Local Air Monitoring Stations. The Clean Air Act requires that every state establish a network of air monitoring stations for criteria pollutants.
SPM	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.
Sulfur Dioxide	Sulfur dioxide (SO_2) 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.
VOCs	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.
Vog	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 [a]	Federal Secondary Standard [b]
Carbon Monoxide (CO)	1-hour 8-hour	9 ppm 4.4 ppm	35 ppm 9 ppm	None
Nitrogen Dioxide (NO_2)	1-hour eff. 1/22/2010 Annual	--- 0.04 ppm	0.100 ppm 0.053 ppm	--- 0.053 ppm
PM_{10}	24-hour Annual [c]	150 µg/m^3 50 µg/m^3	150 µg/m^3 ---	150 µg/m^3 ---
$PM_{2.5}$	24-hour Annual	---	35 µg/m^3 15 µg/m^3	35 µg/m^3 15 µg/m^3
Ozone (O_3)	8-hour	0.08 ppm	0.075 ppm	0.075 ppm
Sulfur Dioxide (SO_2)	1-hour eff. 6/2/2010 3-hour 24-hour Annual	--- 0.5 ppm 0.14 ppm 0.03 ppm	0.075 ppm --- 0.14 ppm 0.03 ppm	0.5 ppm
Lead (Pb)	Calendar Quarter	1.5 µg/m^3	0.15 µg/m^3	0.15 µg/m^3
Hydrogen Sulfide	1-hour	0.025 ppm	None	None

a ***Primary Standards*** set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children and the elderly.

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

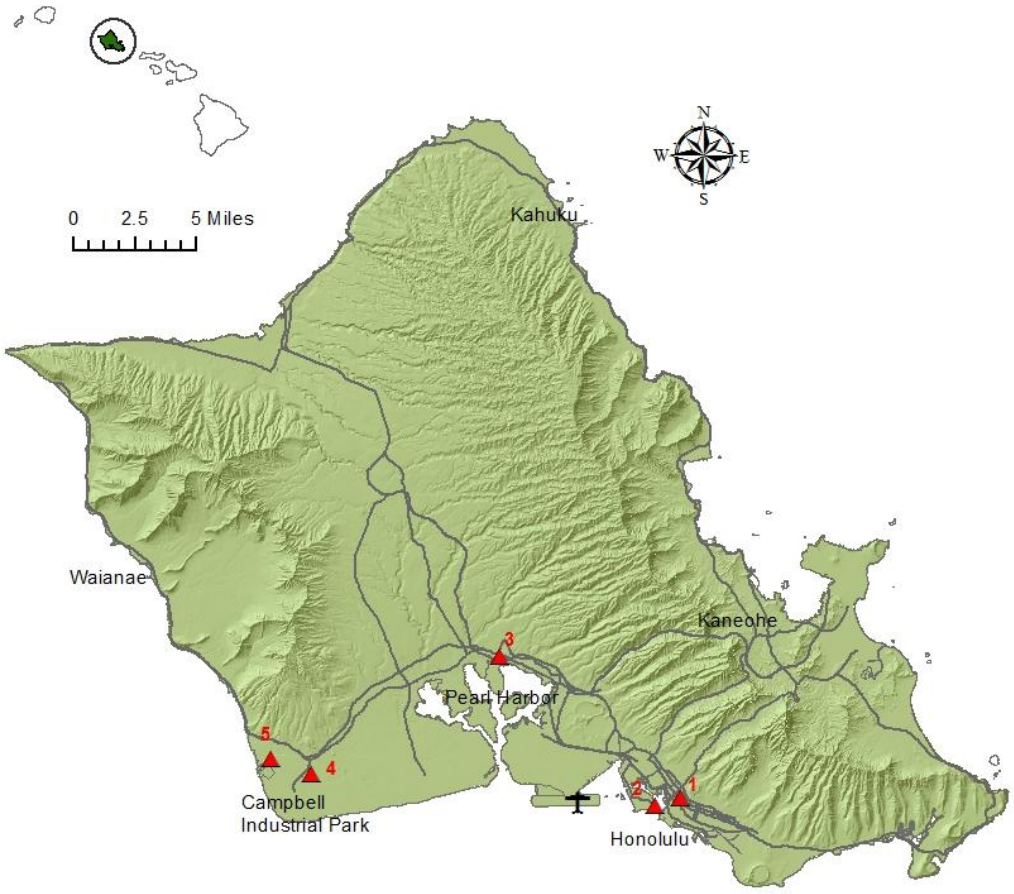
c Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, EPA revoked the annual PM_{10} standard effective December 17, 2006. However, the state still has an annual standard.

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_2 1-hour: The 3-year average of the 98th percentile daily maximum 1-hour averages must not exceed the standard.
NO_2 Annual: Average of all 1-hour values in the year may not exceed the level of the standard.
PM_{10} 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)
$PM_{2.5}$ 24-hour: The 3-year average of the 98th percentile 24-hour concentrations must not exceed the level of the standard.
$PM_{2.5}$ 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_2 1-hour: The 3-year average of the 99th percentile daily maximum 1-hour averages must not exceed the standard.
SO_2 3-hour: Not be exceeded more than once per year.
SO_2 24-hour: Not be exceeded more than once per year.
SO_2 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_{10}, $PM_{2.5}$, CO, SO_2
2	Sand Island	1039 Sand Island Pkwy	O_3, $PM_{2.5}$
3	Pearl City	860 4th St.	PM_{10}, $PM_{2.5}$
4	Kapolei	2052 Lauwiliwili St.	PM_{10}, $PM_{2.5}$, CO, SO_2, NO_2, $PM_{2.5}$ Speciation; NCore
5	West Beach	Ko'Olina Golf Course	PM_{10}, SO_2, NO_2

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

Honolulu (DH)		
	**Location:**	1250 Punchbowl St., Honolulu
	Latitude:	21.30758
	Longitude:	-157.85542
	Altitude:	20 m
	Parameters:	SO_2, CO, PM_{10}, $PM_{2.5}$
	Established:	February 1971
	Brief Description:	
	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.	

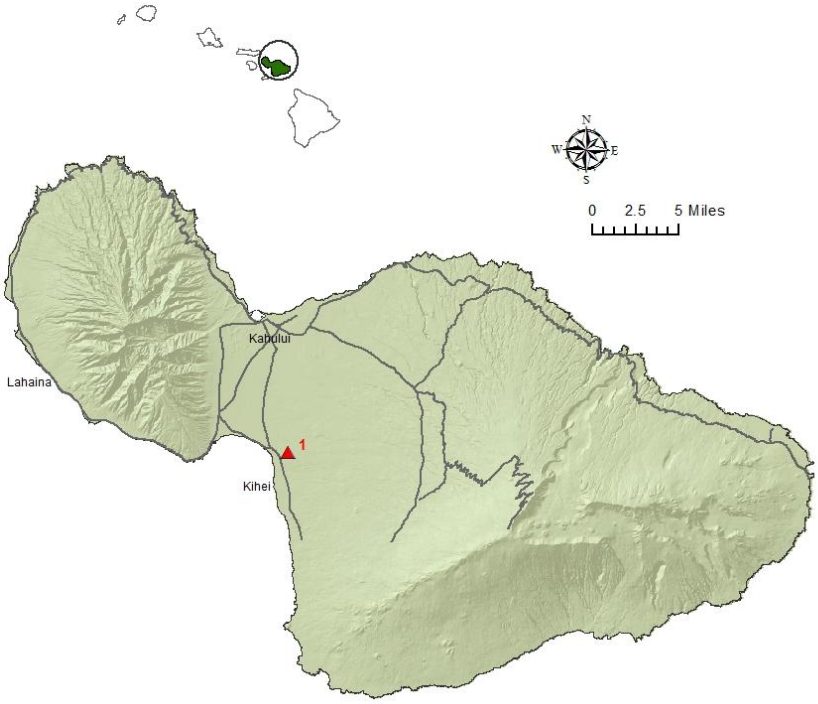
Kapolei (KA)		
	**Location:**	2052 Lauwiliwili St., Kapolei
	Latitude:	21.32374
	Longitude:	-158.08861
	Altitude:	17.9 m
	Parameters:	SO_2, CO, NO_2, PM_{10}, $PM_{2.5}$, $PM_{2.5}$ speciation, NCore
	Established:	July 2002
	Brief Description:	
	Located in the Kapolei Business Park, southeast of the Kapolei Fire Station, next to a drainage canal that separates the park from Barber's Point.	

Pearl City (PC)		
	**Location:**	860 4th St., Pearl City
	Latitude:	21.39283
	Longitude:	-157.96913
	Altitude:	23.1 m
	Parameters:	PM_{10}, $PM_{2.5}$
	Established:	May 1979
	Brief Description:	
	Located on the roof of the Leeward Health Center in a commercial, residential and light industrial area approximately 1.5 miles northwest of the Waiau 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_3, $PM_{2.5}$
	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.	

West Beach (WB)		
	**Location:**	Ko'Olina Golf Course, Kapolei
	Latitude:	21.33274
	Longitude:	-158.11413
	Altitude:	14.5 m
	Parameters:	SO_2, NO_2, PM_{10}
	Established:	February 1991
	Brief Description:	
	Within the Ko'Olina resort and residential community next to the Ko'Olina golf course and approximately 1.5 miles northwest of Campbell Industrial Park. Station shut down March 31, 2011.	

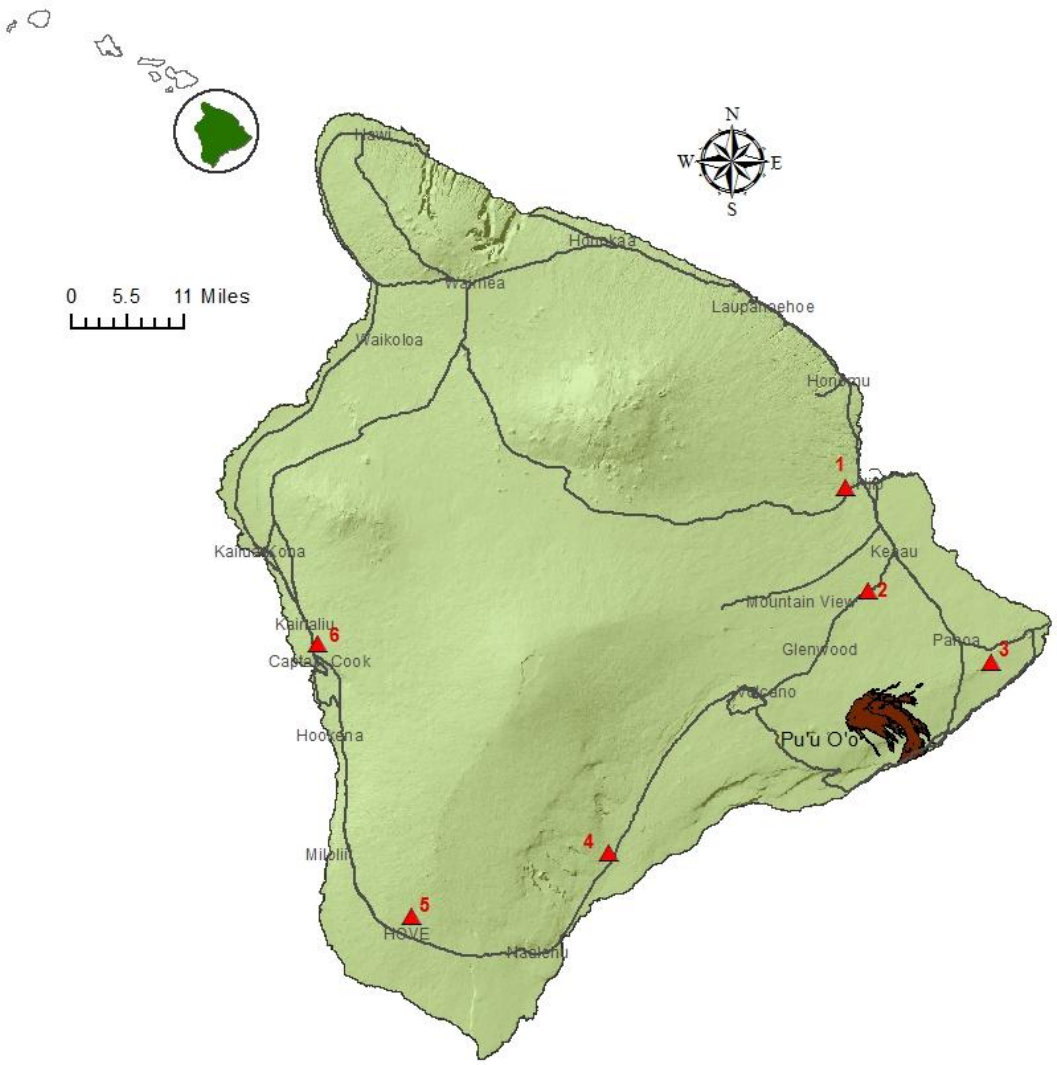
Figure 3-2: Island of Maui - Air Monitoring Station



Station	Name	Location	Pollutants Monitored
1	Kihei	Hale Piilani Park	$PM_{2.5}$

Kihei (KH)		
	**Location:**	Hale Piilani Park, Kihei
	Latitude:	20.780997
	Longitude:	-156.44637
	Altitude:	46.5 m
	Parameters:	$PM_{2.5}$
	Established:	February 1999
	Brief Description:	
	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.	$PM_{2.5}$, SO_2
2	Mountain View	17-1235 Volcano Rd.	$PM_{2.5}$, SO_2
3	Puna E	TMK (3)-1-3-28-37 (Leilani)	H_2S, SO_2
4	Pahala	96-3150 Pikake St.	$PM_{2.5}$, SO_2
5	Ocean View	92-6091 Orchid Mauka Circ.	$PM_{2.5}$, SO_2
6	Kona	81-1043 Konawaena School Rd.	$PM_{2.5}$, SO_2

Hilo (HL)		
	**Location:**	1099 Waianuenue Ave., Hilo
	Latitude:	19.71756
	Longitude:	-155.11053
	Altitude:	136.8 m
	Parameters:	SO_2, $PM_{2.5}$
	Established:	January 1997
	Brief Description:	
	Located near the Hilo Medical Center, this station was established to monitor vog during “Kona” or southerly wind conditions.	

Kona (KN)		
	**Location:**	81-1043 Konawaena School Rd., Kona
	Latitude:	19.50978
	Longitude:	-155.91342
	Altitude:	517.2 m
	Parameters:	SO_2, $PM_{2.5}$
	Established:	September 2005
	Brief Description:	
	Located on the upper campus of Konawaena High School, this station monitors for vog on the west side of the island of Hawaii.	

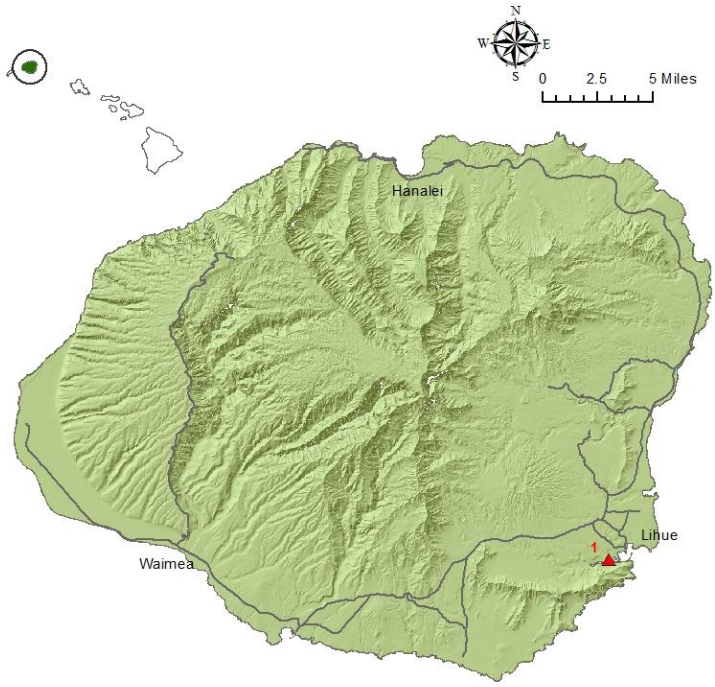
Mt. View (MV)		
	**Location:**	17-1235 Volcano Rd., Mt. View
	Latitude:	19.57002
	Longitude:	-155.08046
	Altitude:	436.5 m
	Parameters:	SO_2, $PM_{2.5}$
	Established:	December 2010
	Brief Description:	
	Located on the grounds of the Mt. View Elementary School, this station was established to monitor vog during southerly wind conditions.	

Ocean View (OV)		
	**Location:**	92-6091 Orchid Mauka Circle, Ocean View
	Latitude:	19.11756
	Longitude:	-155.77814
	Altitude:	862.6 m
	Parameters:	SO_2, $PM_{2.5}$
	Established:	April 2010
	Brief Description:	
	This station is located in Hawaii Ocean View Estates at the Ocean View fire station and monitors for volcanic emissions.	

Pahala (PA)		
	**Location:**	96-3150 Pikake St., Pahala
	Latitude:	19.2039
	Longitude:	-155.48018
	Altitude:	320 m
	Parameters:	SO_2, $PM_{2.5}$
	Established:	August 2007
	Brief Description:	
	The station is on the grounds of the Kau High and Pahala Elementary School, monitoring for volcanic emissions.	

Puna E (PE)		
	**Location:**	13-763 Leilani Ave., Pahoa
	Latitude:	19.46399
	Longitude:	-154.89871
	Altitude:	207.9 m
	Parameters:	SO_2, H_2S
	Established:	March 1991
	Brief Description:	
	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_2 emissions from the volcano during southwesterly wind conditions.	

Figure 3-4: Island of Kauai Air Monitoring Station



Station	Name	Location	Pollutants Monitored
1	Niumalu	2342 Hulemalu Rd.	SO_2, NO_2, CO, $PM_{2.5}$

Niumalu (NI)		
	**Location:**	2342 Hulemalu Road, Lihue
	Latitude:	21.9495
	Longitude:	-159.365
	Altitude:	11 m
	Parameters:	SO_2, CO, NO_2, $PM_{2.5}$
	Established:	April 2011
	Brief Description:	
	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**

	Pollutants Monitored and Station Type								
SITE	**PM_{10}**	**$PM_{2.5}$**	**CO**	**O_3**	**SO_2**	**NO_2**	**H_2S**	**MONITORING OBJECTIVE**	**LAND USE[1]**
OAHU									
Honolulu	S	S	S	-	S	-	-	Population Exposure	Urban and Center City
Kapolei	S	S,C	S	-	S	S	-	Population Exposure	Urban
Pearl City	S	S	-	-	-	-	-	Population Exposure	Urban and Center City
Sand Island	-	S	-	S	-	-	-	Maximum Concentration (O_3) Transport ($PM_{2.5}$)	Urban and Center City
West Beach[2]	S	-	-	-	S	S	-	Source Impact	Urban
MAUI									
Kihei	-	S	-	-	-	-	-	Source Impact (cane burning)	Agricultural
HAWAII									
Hilo	-	SPM	-	-	S	-	-	Population Exposure	Urban
Kona	-	SPM	-	-	S	-	-	Population Exposure (SO_2)/ Maximum concentration ($PM_{2.5}$)	Urban
Mountain View	-	SPM	-	-	SPM	-	-	Source Impact	Agricultural
Ocean View	-	SPM	-	-	SPM	-	-	Welfare Impact (SO_2)/ Source Impact ($PM_{2.5}$)	Agricultural
Pahala	-	SPM	-	-	SPM	-	-	Maximum concentration (SO_2)/ Source Impact ($PM_{2.5}$)	Urban
Puna E	-	-	-	-	SPM	-	SPM	Source Impact (geothermal and volcano)	Agricultural
KAUAI									
Niumalu [3]	-	SPM	SPM	-	SPM	SPM	-	Source Impact (cruise ships)	Urban

C = Collocated Site
S = (SLAMS) State and Local Air Monitoring Station
SPM = Special Purpose Monitoring Station (for monitoring vog and geothermal energy production)
[1] Land use information is from the State of Hawaii Department of Business Economic Development and Tourism
[2] West Beach closed 3/31/11
[3] Niumalu began operating 4/1/11

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

Monitoring Station	PM_{10} Continuous Ambient Particulate Monitor	$PM_{2.5}$ Manual Particulate Monitor	$PM_{2.5}$ Continuous Monitor	CO Continuous Gas Filter Correlation Analyzer	SO_2 Continuous Pulsed Fluorescence Ambient Air Analyzer	O_3 Continuous UV Photometric Analyzer	NO_2 Continuous Chemiluminescence Analyzer	H_2S Continuous Pulsed Fluorescence Ambient Air Analyzer
OAHU Honolulu	■		■	■	■			
Kapolei	■	■	■	■	■		■	
Pearl City	■		■					
Sand Island			■			■		
West Beach	■				■		■	
MAUI Kihei			■					
HAWAII Hilo			■		■			
Kona			■		■			
Mt. View			■		■			
Ocean View			■		■			
Pahala			■		■			
Puna E					■			■
KAUAI Niumalu			■	■	■		■	

Section 4
2011 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_2 and $PM_{2.5}$, with regular exceedances of the NAAQS for SO_2 and occasional exceedances of the NAAQS for $PM_{2.5}$. 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 and the fireworks from the New Year's celebration, considered an exceptional event, in 2011 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_2S standard (there is no federal H_2S standard);
- The "Maximum" is the highest and second highest valid values recorded in the year for the averaging period. For $PM_{2.5}$, the maximum and 98^{th} percentile concentrations are provided and for O_3, the 4^{th} 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. 2011 Summary of the 24-Hour PM_{10} Averages

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 150 µg/m^3														
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	50	35	12.2	0	0	0	0	0	0	0	0	0	0	0	0	365	364	99.7
Kapolei	51	38	16.3	0	0	0	0	0	0	0	0	0	0	0	0	365	343	94.0
Pearl City	58	46 [1]	17.9	0	0	0	0	0	0	0	0	0	0	0	0	365	360	96.7
West Beach	49	39	19 [2]	0	0	0	-	-	-	-	-	-	-	-	-	90 [3]	85	94.4

[1] New Year's fireworks [2] Does not meet summary criteria, <75% data recovery in year [3] Station closed 3/31/2011, incomplete year

Table 4-2. Attainment Determination of the 24-Hour PM_{10} NAAQS

Station	Exceedances in 2009	Exceedances in 2010	Exceedances in 2011	Sites in violation of the NAAQS
Honolulu	0	0	0	0
Kapolei	0	0	0	0
Pearl City	0	0	0	0
West Beach	0	0	0	0

Attainment: The standard not to be exceeded more than once per year on average over 3 years.
In 2011, Hawaii was in attainment with the 24-hour PM_{10} NAAQS.

Table 4-3. 2011 Summary of the 24-Hour $PM_{2.5}$ Averages: SLAMS Stations

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 35 µg/m^3														
	1st High	98th %	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	25.0[1]	9.4	4.7	0	0	0	0	0	0	0	0	0	0	0	0	365	347	95.1
Kapolei	21.2	12.6	5.3	0	0	0	0	0	0	0	0	0	0	0	0	365	336	92.1
Pearl City	35.7[1]	10.1	5.0	1[1]	0	0	0	0	0	0	0	0	0	0	0	365	353	96.7
Sand Island	27.7[1]	19.8	9.1	0	0	0	0	0	0	0	0	0	0	0	0	365	315	86.3
MAUI																		
Kihei	15	13.0	5.9 [2]	0	0	0	0	0	0	0	0	0	0	0	0	365	301	82.5

[1] New Year's fireworks [2] Does not meet summary criteria, <75% data recovery in 3rd quarter

Table 4-4. Attainment Determination of the 24-Hour $PM_{2.5}$ NAAQS: SLAMS Stations

Station	2009 98th value	2010 98th value	2011 98th value	3-Year Average	Sites in violation of the NAAQS
Honolulu	14	12	9	12	0
Kapolei	12	12	13	12	0
Pearl City	12	13	10	12	0
Sand Island	13	17	20	17	0
Kihei	16	14	13	14	0

Attainment: The 3-year average of the 98th percentile values must be less than or equal to 35 µg/m^3.
In 2011, Hawaii was in attainment with the 24-hour $PM_{2.5}$ NAAQS.

Table 4-5. Attainment Determination of the Annual $PM_{2.5}$ NAAQS: SLAMS Stations

Station	2009 Ann. Avg.	2010 Ann. Avg.	2011 Ann. Avg.	3-Year Average	Sites in violation of the NAAQS
Honolulu	5.0	4.7	4.7	4.8	0
Kapolei	5.4	4.3	5.3	5.0	0
Pearl City	4.9	4.4	5.0	4.8	0
Sand Island	6.9	10	9.1	8.7	0
Kihei	3.8	4.8	5.9	4.8	0

Attainment: The 3-year average of annual mean values must be less than 15 µg/m^3.
In 2011, Hawaii was in attainment with the annual $PM_{2.5}$ NAAQS.

Table 4-6. 2011 Summary of the 24-Hour $PM_{2.5}$ Averages: SPM Stations

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 35 µg/m^3														
	1st High	98th %	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
HAWAII																		
Hilo	21.7	13.6	4.5	0	0	0	0	0	0	0	0	0	0	0	0	365	335	91.8
Kona	27.5	21.2	12.2	0	0	0	0	0	0	0	0	0	0	0	0	365	355	97.3
Mt. View	14.8	10.8	4.4	0	0	0	0	0	0	0	0	0	0	0	0	365	332	91.0
Ocean View	24.5	20.3	9.9	0	0	0	0	0	0	0	0	0	0	0	0	365	349	95.6
Pahala	20.7	13.8	6.1	0	0	0	0	0	0	0	0	0	0	0	0	365	356	97.5
KAUAI																		
Niumalu	15.9	12.7	4.9 [1]	-	-	-	0	0	0	0	0	0	0	0	0	275 [2]	248	90.2

The special purpose stations on Hawaii island were established to monitor ambient air concentrations of $PM_{2.5}$ from volcanic emissions. The special purpose station on Kauai was established to monitor emissions from cruise ships.
[1] Does not meet summary criteria, <75% data recovery in year [2] Station began 4/1/2011, incomplete year

Table 4-7. 2011 Summary of the 8-Hour O_3 Averages

	Maximum			Annual Mean	No. of Daily Maximum 8-Hour Averages Greater than 0.075 ppm														
	1st High	2nd High	4th High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																			
Sand Island	0.047	0.047	0.046	0.024	0	0	0	0	0	0	0	0	0	0	0	0	8755	8392	95.9

Table 4-8. Attainment Determination of the 8-Hour O_3 NAAQS

Station	2009 4th highest	2010 4th highest	2011 4th highest	3-Year Average	Site in violation of the NAAQS
Sand Island	0.048	0.047	0.046	0.047	0

Attainment: The 3-year average of the annual 4th highest daily maximum 8-hour average must be less than or equal to 0.075 ppm.
In 2011, Hawaii was in attainment with the 8-hour O_3 NAAQS.

Table 4-9. 2011 Summary of the 1-Hour and Annual NO_2 Averages

	Maximum 1-hr		Annual Mean	No. of Daily Maximum 1-Hour Averages Greater than 0.100 ppm														
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU	**SLAMS stations**																	
Kapolei	0.025	0.025	0.003	0	0	0	0	0	0	0	0	0	0	0	0	8760	8476	96.8
West Beach	0.023	0.021	0.002 [1]	0	0	0	-	-	-	-	-	-	-	-	-	2160 [2]	1725	79.9
KAUAI	**SPM Station**																	
Niumalu	0.025	0.025	0.003 [3]	-	-	-	0	0	0	0	0	0	0	0	0	6600 [4]	5982	90.6

Attainment of the annual NO_2 NAAQS: The annual mean shall not exceed 0.053 ppm.
In 2011, Hawaii was in attainment with the annual NO_2 NAAQS.
[1] Does not meet summary criteria, <75% data recovery in year
[2] Station closed 3/31/2011, incomplete year
[3] Does not meet summary criteria, <75% data recovery in year
[4] Station began 4/1/2011, incomplete year

Table 4-10. 2011 Summary of the 1-Hour CO Averages

	Maximum		Annual Mean	No. of 1-hour Averages Greater than 35 ppm													
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU	**SLAMS stations**																	
Honolulu	1.4	1.1	0.4	0	0	0	0	0	0	0	0	0	0	0	0	8760	8558	97.7
Kapolei	1.2	1.2	0.6	0	0	0	0	0	0	0	0	0	0	0	0	8760	8501	97.0
KAUAI	**SPM Station**																	
Niumalu	0.7	0.7	0.4 [1]	-	-	-	0	0	0	0	0	0	0	0	0	6600 [2]	1036 [3]	15.7 [3]

Attainment: 1-hour values not to exceed 35 ppm more than once per year.
In 2011, Hawaii was in attainment with the 1-hour CO NAAQS.

[1] Does not meet summary criteria, <75% data recovery in year [2] Station began 4/1/2011, incomplete year [3] CO monitor malfunction, no parts available for repair

Table 4-11. 2011 Summary of the 8-Hour CO Averages

	Maximum		Annual Mean	No. of 8-hour Averages Greater than 9 ppm													
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU	**SLAMS stations**																	
Honolulu	0.8	0.8	0.4	0	0	0	0	0	0	0	0	0	0	0	0	8755	8629	98.6
Kapolei	1.0	1.0	0.6	0	0	0	0	0	0	0	0	0	0	0	0	8755	8610	98.3
KAUAI	**SPM Station**																	
Niumalu	0.7	0.7	0.4 [1]	-	-	-	0	0	0	0	0	0	0	0	0	6600 [2]	1043 [3]	15.8 [3]

Attainment: 8-hour values not to exceed 9 ppm more than once per year.
In 2011, Hawaii was in attainment with the 8-hour CO NAAQS.

[1] Does not meet summary criteria, <75% data recovery in year [2] Station began 4/1/2011, incomplete year [3] CO monitor malfunction, no parts available for repair

Table 4-12. 2011 Summary of the 1-Hour SO_2 Averages

	Maximum		Annual Mean	No. of 1-hour Averages Greater than 0.075 ppm														
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU	**SLAMS Stations**																	
Honolulu	0.024	0.010	0.001	0	0	0	0	0	0	0	0	0	0	0	0	8760	8431	96.2
Kapolei	0.019	0.007	0.002	0	0	0	0	0	0	0	0	0	0	0	0	8760	8497	97.0
West Beach	0.018	0.017	0.002 [1]	0	0	0	-	-	-	-	-	-	-	-	-	2160 [2]	1758	81.4
HAWAII	**SPM Stations (see NOTE)**																	
Hilo	0.288	0.225	0.003	4	3	0	0	0	0	0	0	0	0	0	1	8760	8398	95.9
Kona	0.089	0.055	0.003	0	0	0	0	0	0	0	0	0	1	0	0	8760	8367	95.5
Mt. View	0.333	0.261	0.002	7	6	2	0	0	0	0	0	0	0	0	1	8760	8416	96.1
Ocean View	1.027	0.611	0.013	15	7	2	0	5	5	6	3	10	8	11	21	8760	8610	98.3
Pahala	0.861	0.776	0.034	18	8	12	7	14	14	24	12	19	30	28	27	8760	8574	97.9
Puna E	0.017	0.014	0.001	0	0	0	0	0	0	0	0	0	0	0	0	8760	8486	96.9
KAUAI	**SPM Station**																	
Niumalu	0.078	0.063	0.003 [3]	-	-	-	0	1	0	0	0	0	0	0	0	6600 [4]	6358	96.3

Attainment: The 3-year average of the 99th percentile values must be less than or equal to 0.075 ppm. Effective June 2, 2010.
In 2011, Hawaii was in attainment with the 1-hour SO_2 NAAQS (SLAMS stations only).

NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO_2 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.

[1] Does not meet summary criteria, <75% data recovery in year [2] Station closed 3/31/2011, incomplete year [3] Does not meet summary criteria, <75% data recovery in year
[4] Station began 4/1/2011, incomplete year

Table 4-13. 2011 Summary of the 3-Hour SO_2 Averages

	Maximum		Annual Mean	No. of 3-hour Averages Greater than 0.500 ppm														
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU	**SLAMS stations**																	
Honolulu	0.012	0.008	0.001	0	0	0	0	0	0	0	0	0	0	0	0	2920	2757	94.4
Kapolei	0.013	0.004	0.002	0	0	0	0	0	0	0	0	0	0	0	0	2920	2723	93.3
West Beach	0.013	0.009	0.002 [1]	0	0	0	-	-	-	-	-	-	-	-	-	720 [2]	546	75.8
HAWAII	**SPM stations (see NOTE)**																	
Hilo	0.153	0.126	0.003	0	0	0	0	0	0	0	0	0	0	0	0	2920	2674	91.6
Kona	0.065	0.053	0.003	0	0	0	0	0	0	0	0	0	0	0	0	2920	2709	92.8
Mt. View	0.158	0.138	0.002	0	0	0	0	0	0	0	0	0	0	0	0	2920	2712	92.9
Ocean View	0.518	0.362	0.013	0	0	0	0	0	0	0	0	0	0	0	0	2920	2800	95.9
Pahala	0.616	0.556	0.034	0	0	0	0	0	0	0	0	0	1	0	1	2920	2778	95.1
Puna E	0.016	0.013	0.001	0	0	0	0	0	0	0	0	0	0	0	0	2920	2758	94.5
KAUAI	**SPM station**																	
Niumalu	0.055	0.055	0.003 [3]	-	-	-	0	0	0	0	0	0	0	0	0	2200 [4]	2079	94.5

Attainment: 3-hour values not to exceed 0.500 ppm more than once per year.
In 2011, Hawaii was in attainment with the 3-hour SO_2 NAAQS (SLAMS stations only).

NOTE: The SPM stations on Hawaii island were established to monitor ambient air concentrations of SO_2 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.

[1] Does not meet summary criteria, <75% data recovery in year [2] Station closed 3/31/2011, incomplete year [3] Does not meet summary criteria, <75% data recovery in year
[4] Station began 4/1/2011, incomplete year

Table 4-14. 2011 Summary of the 24-Hour and Annual SO_2 Averages

	Maximum		Annual Mean	No. of 24-hour Averages Greater than 0.140 ppm														
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU	**SLAMS Stations**																	
Honolulu	0.005	0.002	0.001	0	0	0	0	0	0	0	0	0	0	0	0	365	354	97.0
Kapolei	0.003	0.003	0.002	0	0	0	0	0	0	0	0	0	0	0	0	365	359	98.4
West Beach	0.003	0.003	0.002 [1]	0	0	0	-	-	-	-	-	-	-	-	-	90 [2]	73	81.1
HAWAII	**SPM Stations (see NOTE)**																	
Hilo	0.036	0.032	0.003	0	0	0	0	0	0	0	0	0	0	0	0	365	357	97.8
Kona	0.019	0.018	0.003	0	0	0	0	0	0	0	0	0	0	0	0	365	349	95.6
Mt. View	0.062	0.045	0.002	0	0	0	0	0	0	0	0	0	0	0	0	365	355	97.3
Ocean View	0.140	0.133	0.013	0	0	0	0	0	0	0	0	0	0	0	0	365	363	99.5
Pahala	0.239	0.200	0.034	0	0	0	0	0	0	0	0	0	2	1	2	365	361	98.9
Puna E	0.005	0.004	0.001	0	0	0	0	0	0	0	0	0	0	0	0	365	358	98.1
KAUAI	**SPM Station**																	
Niumalu	0.055	0.055	0.003 [3]	-	-	-	0	0	0	0	0	0	0	0	0	275	269	97.8

Attainment: 24-hour values not to exceed 0.14 ppm more than once per year.
In 2011, Hawaii was in attainment with the 24-hour SO_2 NAAQS (SLAMS stations only).

NOTE: The SPM stations were established to monitor ambient air concentrations of SO_2 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.

Attainment: Annual average (from SLAMS stations only) not to exceed 0.03 ppm.
In 2011, Hawaii was in attainment with the annual SO_2 NAAQS.

NOTE: The SPM stations were established to monitor ambient air concentrations of SO_2 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.

[1] Does not meet summary criteria, <75% data recovery in year [2] Station closed 3/31/2011, incomplete year [3] Does not meet summary criteria, <75% data recovery in year
[4] Station began 4/1/2011, incomplete year

Table 4-15. 2011 Summary of the 1-Hour H_2S Averages (State Standard)

	Maximum		Annual Mean	No. of 1-hour Averages Greater than 0.025 ppm														
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
HAWAII																		
Puna E	0.004	0.003	0.001	0	0	0	0	0	0	0	0	0	0	0	0	8760	8203	93.6
Attainment of the state standard: 1-hour values not to exceed 0.025 ppm. **In 2011, Hawaii was in attainment of the state 1-hour H_2S standard.**																		

Table 4-16. 2011 Monthly Maximum of 24-Hour PM_{10} Values ($\mu g/m^3$)

The month with the highest value in the year is highlighted *The state and federal 24-hr PM_{10} standard is 150 $\mu g/m^3$*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Honolulu	32	21	50	23	24	20	17	16	13	17	23	19
Kapolei	31	25	51	26	23	26	33	27	17	37	20	26
Pearl City	46	32	58	31	31	29	25	23	22	24	25	28
West Beach [1]	30	38	49	station closed	station closed	station closed	station closed	station closed	station closed	station closed	station closed	station closed

[1] West Beach station shut down on March 31, 2011

Table 4-17. 2011 Monthly Maximum of 24-Hour $PM_{2.5}$ Values ($\mu g/m^3$)

The month with the highest value in the year is highlighted

The federal 24-hr $PM_{2.5}$ standard is 35 $\mu g/m^3$

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SLAMS Stations												
Honolulu	25 [1]	11	20	9	9	7	7	7	7	8	8	8
Kapolei	17	13	21	14	13	12	4	4	7	8	12	9
Pearl City	36 [1]	9	21	11	8	7	6	6	6	9	7	7
Sand Island	28 [1]	21	26	19	17	9	8	7	7	9	8	13
Kihei	9	15	14	12	12	11	12	14	14	10	12	9
SPM Stations												
Niumalu [2] (cruise ships)	station not established	station not established	station not established	13	16	10	13	8	5	7	9	13
Hilo (volcano)	22	17	17	8	8	7	6	6	6	6	8	12
Kona (volcano)	19	28	25	10	14	20	23	22	17	19	20	21
Mt. View (volcano)	13	15	13	7	8	8	7	8	8	11	5	11
Ocean View (volcano)	18	25	21	7	14	13	23	23	15	18	18	23
Pahala (volcano)	18	21	13	8	9	8	8	8	10	14	17	20

[1] Occurred during New Year's fireworks celebration on January 1; exceptional event documentation has been submitted to EPA for the exceedance at Pearl City

[2] Niumalu station began April 1, 2012

Table 4-18. 2011 Monthly Maximum of 1-Hour NO_2 Values (ppm)

The month with the highest value in the year is highlighted *The federal 1-hour standard for NO_2 is 0.100 ppm*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kapolei	0.025	0.024	0.018	0.019	0.016	0.014	0.012	0.011	0.021	0.024	0.021	0.020
West Beach [1]	0.023	0.021	0.019	station closed	station closed	station closed	station closed	station closed	station closed	station closed	station closed	station closed
Niumalu [2]	station not established	station not established	station not established	0.018	0.039	0.030	0.020	0.020	0.020	0.032	0.032	0.031

[1] West Beach station shut down on March 31, 2011 [2] Niumalu station began April 1, 2012

Table 4-19. 2011 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	1.0	1.0	0.4	0.7	0.6	0.6	0.8	0.8	0.7	0.8	1.4	1.1
Kapolei	0.8	0.9	1.8	1.2	1.1	0.7	0.8	0.9	1.2	1.0	1.1	1.1

Table 4-20. 2011 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	0.7	0.7	0.3	0.4	0.5	0.5	0.7	0.7	0.4	0.5	0.7	0.8
Kapolei	0.5	0.6	0.7	0.9	1.0	0.5	0.6	0.8	0.9	0.7	0.9	1.0

Table 4-21. 2011 Monthly Maximum of 8-Hour O_3 Values (ppm)

The month with the highest value in the year is highlighted *The federal 8-hr O_3 standard is 0.075 ppm*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sand Island	0.048	0.041	0.047	0.040	0.046	0.033	0.029	0.025	0.032	0.042	0.041	0.036

Table 4-22. 2011 Monthly Maximum of 1-Hour SO_2 Values (ppm)

The month with the highest value in the year is highlighted *The federal 1-hr SO_2 standard is 0.075 ppm (75 ppb)*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SLAMS Stations												
Honolulu	0.009	0.010	0.024	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Kapolei	0.019	0.005	0.005	0.003	0.003	0.003	0.003	0.004	0.007	0.004	0.004	0.004
West Beach [1]	0.018	0.017	0.009	station closed	station closed	station closed	station closed	station closed	station closed	station closed	station closed	station closed
SPM Stations (see NOTE)												
Niumalu [2] (cruise ships)	station not established	station not established	station not established	0.039	0.078	0.048	0.039	0.049	0.027	0.040	0.037	0.063
Hilo (volcano)	0.288	0.148	0.034	0.027	0.008	0.006	0.015	0.007	0.007	0.010	0.013	0.099
Kona (volcano)	0.055	0.023	0.047	0.006	0.010	0.013	0.025	0.018	0.023	0.089	0.025	0.041
Mt. View (volcano)	0.157	0.261	0.333	0.019	0.002	0.002	0.005	0.003	0.004	0.01	0.037	0.085
Ocean View (volcano)	0.547	0.124	0.165	0.069	0.112	0.284	0.203	0.359	0.232	1.027	0.362	0.611
Pahala (volcano)	0.392	0.213	0.204	0.104	0.303	0.496	0.377	00276	0.416	0.861	0.531	0.776
Puna E (volcano)	0.017	0.012	0.002	0.002	0.002	0.002	0.002	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_2 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.

[1] West Beach station shut down on March 31, 2011 [2] Niumalu station began April 1, 2012

Table 4-23. 2011 Monthly Maximum of 3-Hour SO_2 Values (ppm)

The month with the highest value in the year is highlighted *The state and federal 3-hr SO_2 standard is 0.5 ppm*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SLAMS Stations												
Honolulu	0.006	0.006	0.012	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
Kapolei	0.013	0.003	0.004	0.002	0.002	0.002	0.002	0.003	0.004	0.003	0.003	0.002
West Beach [1]	0.013	0.009	0.007	station closed	station closed	station closed	station closed	station closed	station closed	station closed	station closed	station closed
SPM Stations (see NOTE)												
Niumalu [2] (cruise ships)	station not established	station not established	station not established	0.028	0.055	0.042	0.031	0.041	0.025	0.036	0.033	0.051
Hilo (volcano)	0.153	0.102	0.029	0.017	0.006	0.004	0.008	0.005	0.004	0.005	0.009	0.061
Kona (volcano)	0.046	0.018	0.042	0.005	0.010	0.011	0.017	0.012	0.020	0.065	0.023	0.039
Mt. View (volcano)	0.115	0.138	0.158	0.008	0.001	0.001	0.003	0.002	0.002	0.006	0.032	0.073
Ocean View (volcano)	0.358	0.096	0.148	0.035	0.057	0.159	0.104	0.173	0.167	0.518	0.132	0.300
Pahala (volcano)	0.272	0.163	0.140	0.059	0.140	0.490	0.264	0.160	0.315	0.556	0.408	0.616
Puna E (volcano)	0.016	0.008	0.002	0.002	0.001	0.001	0.002	0.002	0.003	0.002	0.002	0.013

NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO_2 from volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 3-hour NAAQS from attainment determinations.

[1] West Beach station shut down on March 31, 2011 [2] Niumalu station began April 1, 2012

Table 4-24. 2011 Monthly Maximum of 24-Hour SO_2 Values (ppm)

The month with the highest value in the year is highlighted *The state and federal 24-hr SO_2 standard is 0.14 ppm*

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SLAMS Stations												
Honolulu	0.002	0.002	0.005	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Kapolei	0.003	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.003
West Beach [1]	0.003	0.003	0.002	station closed	station closed	station closed	station closed	station closed	station closed	station closed	station closed	station closed
SPM Stations (see NOTE)												
Niumalu[2] (cruise ships)	station not established	station not established	station not established	0.009	0.022	0.013	0.017	0.017	0.011	0.017	0.013	0.021
Hilo (volcano)	0.036	0.032	0.012	0.007	0.003	0.003	0.004	0.003	0.001	0.001	0.003	0.024
Kona (volcano)	0.011	0.008	0.017	0.002	0.005	0.005	0.006	0.006	0.005	0.019	0.013	0.018
Mt. View (volcano)	0.032	0.045	0.062	0.003	0.000	0.000	0.001	0.001	0.001	0.002	0.009	0.018
Ocean View (volcano)	0.074	0.024	0.057	0.009	0.017	0.045	0.041	0.042	0.034	0.014	0.048	0.133
Pahala (volcano)	0.084	0.069	0.076	0.022	0.048	0.078	0.075	0.053	0.107	0.200	0.239	0.158
Puna E (volcano)	0.005	0.003	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.004

NOTE: The SPM stations on Hawaii Island were established to monitor ambient air concentrations of SO_2 from volcanic emissions. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the 24-hour NAAQS from attainment determinations.

[1] West Beach station shut down on March 31, 2011 [2] Niumalu station began April 1, 2012

Table 4-25. 2011 Monthly Maximum of 1-Hour H_2S Values (ppm)

The month with the highest value in the year is highlighted *The state H_2S standard is .025 ppm*

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

Section 5
2011 $PM_{2.5}$ 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 $PM_{2.5}$ 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 $PM_{2.5}$, and the capability and availability of current analytical methods.

The filter-based speciation sampler collects samples once every 6 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 $PM_{2.5}$.

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

Table 5-1. Annual Summary of $PM_{2.5}$ Speciation Data

Parameter	1st High (µg/m3)	2nd High (µg/m3)	Annual Mean (µg/m3)	No. of Samples	Percent Recovery
CARBON					
Organic Carbon	0.609	0.599	0.3643	61	100
Elemental Carbon	0.273	0.259	0.1000	61	100
METALS					
Aluminum	0.142	0.099	0.0257	61	100
Antimony	0.057	0.053	0.0201	61	100
Arsenic	0.001	0.001	0.0009	61	100
Barium	0.030	0.030	0.0070	61	100
Bromine	0.005	0.005	0.0016	61	100
Cadmium	0.032	0.025	0.0087	61	100
Calcium	0.410	0.373	0.0782	61	100
Cerium	0.044	0.044	0.0071	61	100
Cesium	0.023	0.023	0.0080	61	100
Chlorine	2.01	1.88	0.6893	61	100
Chromium	0.006	0.005	0.0014	61	100
Cobalt	0.002	0.002	0.0008	61	100
Copper	0.004	0.003	0.0012	61	100
Indium	0.027	0.023	0.0111	61	100
Iron	0.121	0.114	0.0355	61	100
Lead	0.003	0.003	0.0019	61	100
Magnesium	0.135	0.134	0.0407	61	100
Manganese	0.003	0.002	0.0010	61	100
Nickel	0.017	0.012	0.0034	61	100
Phosphorus	0.008	0.008	0.0054	61	100
Potassium	0.110	0.097	0.0280	61	100
Rubidium	0.002	0.001	0.001	61	100
Selenium	0.001	0.001	0.0011	61	100
Silicon	0.924	0.401	0.0542	61	100
Silver	0.020	0.019	0.0096	61	100
Sodium	1.22	1.09	0.4329	61	100
Strontium	0.005	0.004	0.0014	61	100
Sulfur	1.62	1.32	0.2679	61	100
Tin	0.039	0.028	0.0132	61	100
Titanium	0.014	0.012	0.0035	61	100
Vanadium	0.005	0.004	0.0017	61	100
Zinc	0.013	0.004	0.0014	61	100
Zirconium	0.012	0.012	0.0044	61	100

Table 5-1 Continued

Parameter	1st High (µg/m3)	2nd High (µg/m3)	Annual Mean (µg/m3)	No. of Samples	Percent Recovery
IONS					
Ammonium Ion	1.0	0.60	0.062	61	100
Potassium Ion	0.07	0.07	0.020	61	100
Sodium Ion	1.21	1.20	0.501	61	100
Total Nitrate	0.75	0.47	0.201	61	100
Sulfate	5.08	3.94	0.819	61	100

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

[1] Trademarked equipment: Speciation Air Sampling System

Section 6
AMBIENT AIR QUALITY TRENDS

The following graphs illustrate 5-year trends for PM_{10}, $PM_{2.5}$, SO_2, NO_2, O_3, and CO from 2007 to 2011 at all SLAMS stations monitoring for those pollutants.

Figures 6-1 and 6-2 are graphs of the PM_{10} annual and maximum 24-hour averages. The maximum 24-hour PM_{10} 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 $PM_{2.5}$ annual averages. Attainment of the $PM_{2.5}$ 24-hour standard is based on the 98^{th} percentile value at each station, which is depicted in Figure 6-4.

Figures 6-5 and 6-6 are graphs of the SO_2 annual and maximum 24-hour averages.

Figure 6-7 and 6-8 shows the annual and maximum 1-hour averages of NO_2 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_{10} Annual Average: 2007-2011

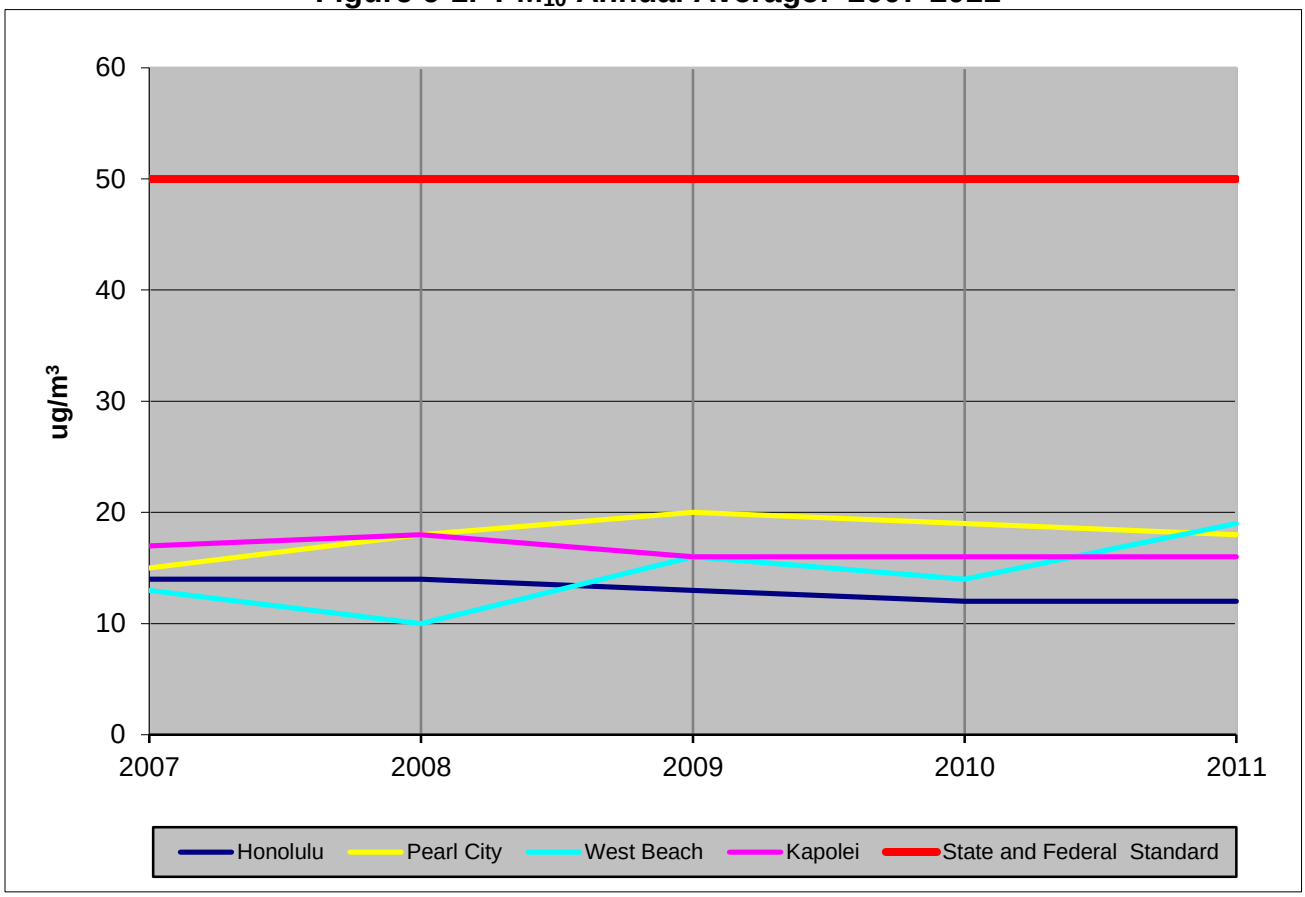


Figure 6-2. PM_{10} Maximum 24-Hour Average: 2007-2011

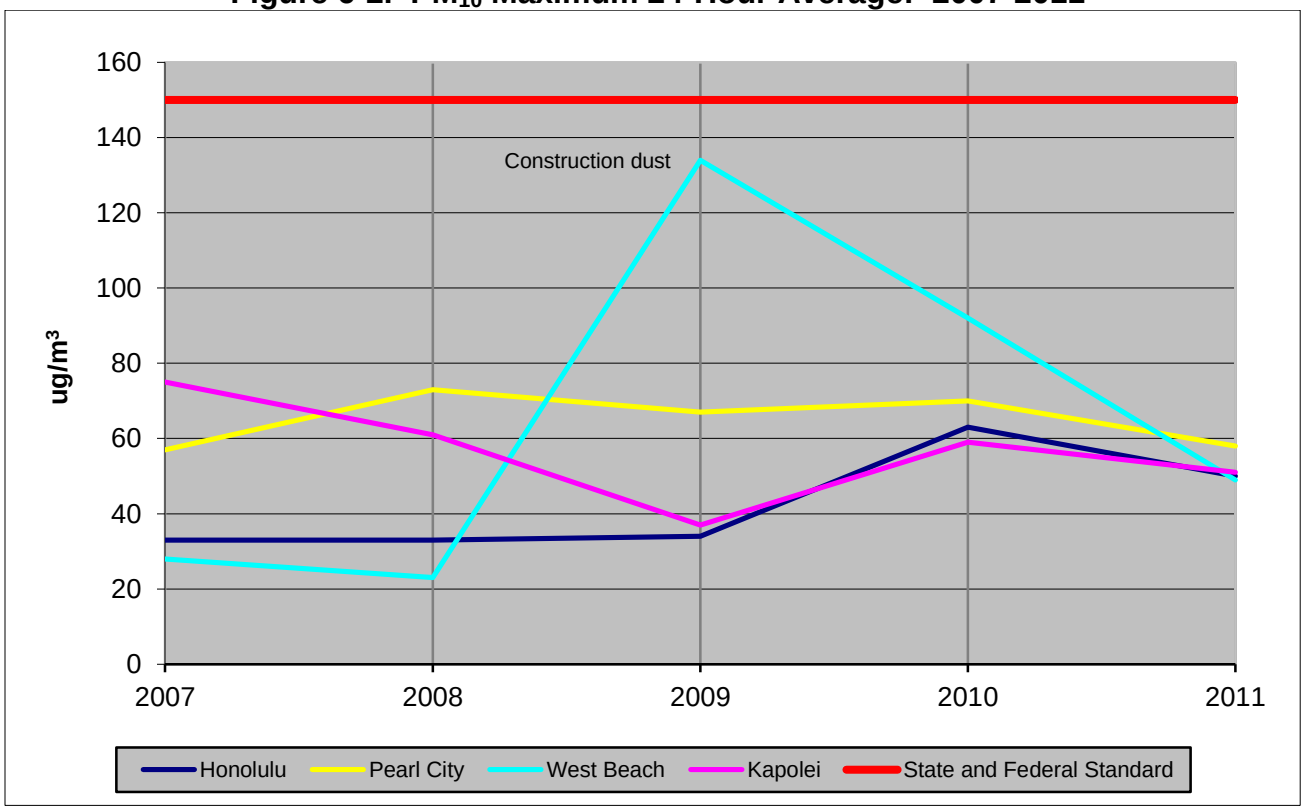


Figure 6-3. $PM_{2.5}$ Annual Average: 2007-2011

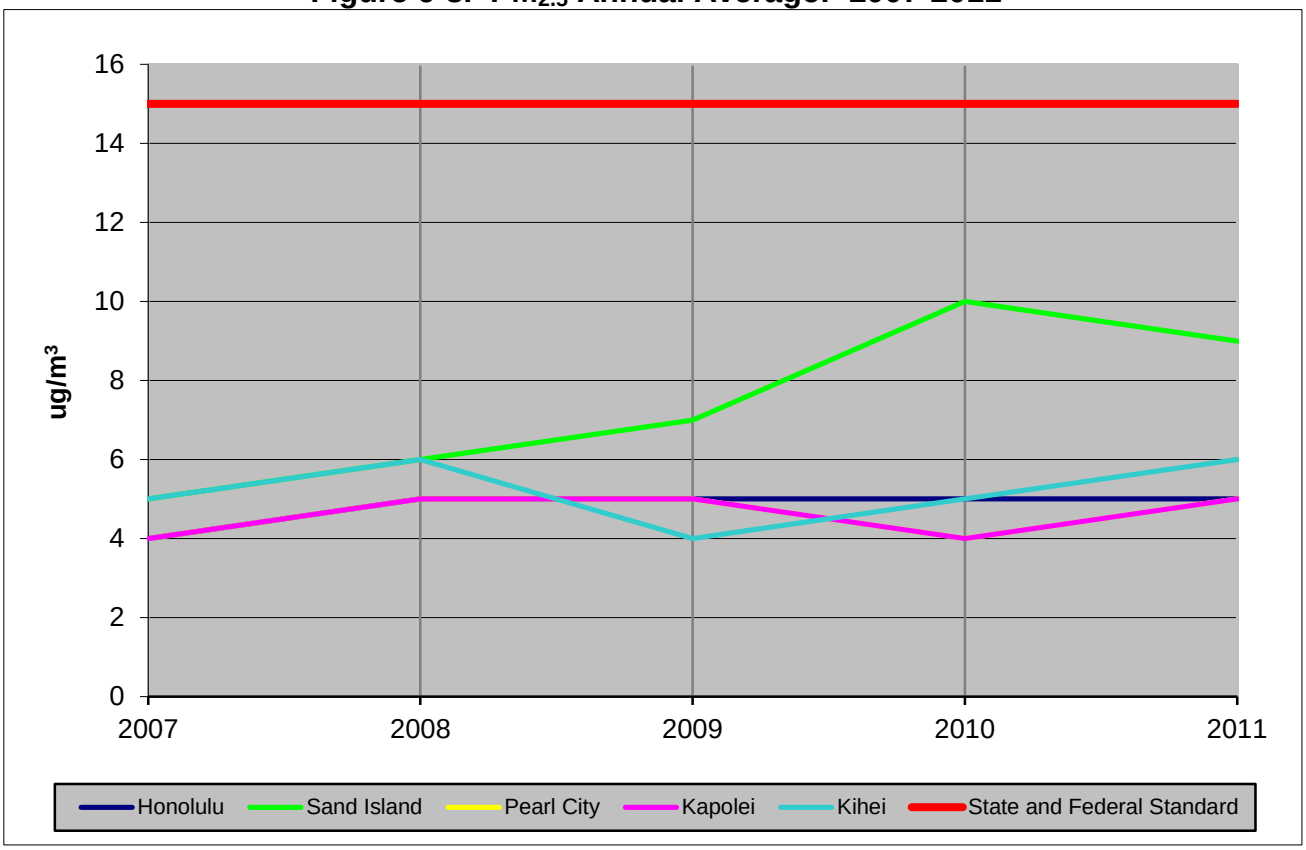


Figure 6-4. $PM_{2.5}$ 98th Percentile 24-Hour Average: 2007-2011

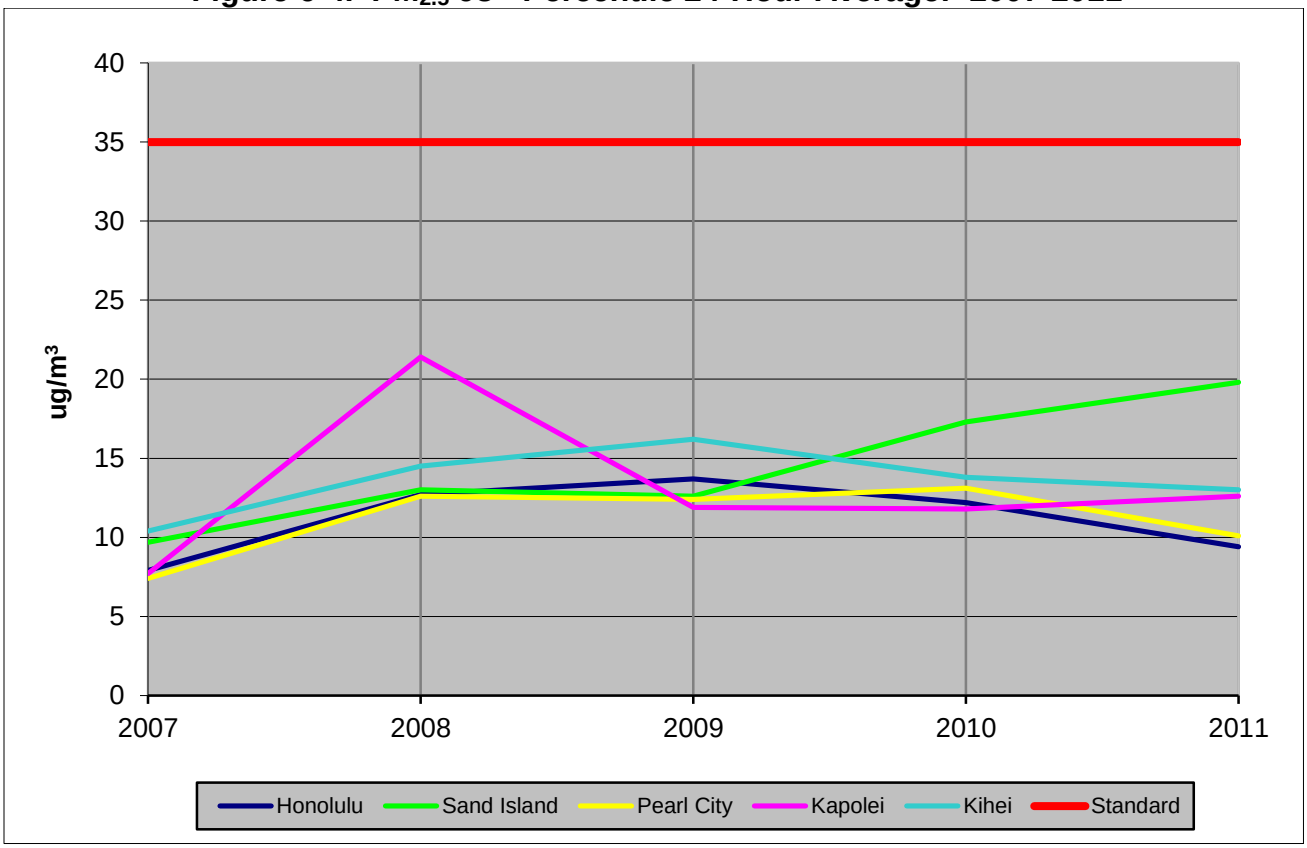


Figure 6-5. SO_2 Annual Average: 2007-2011

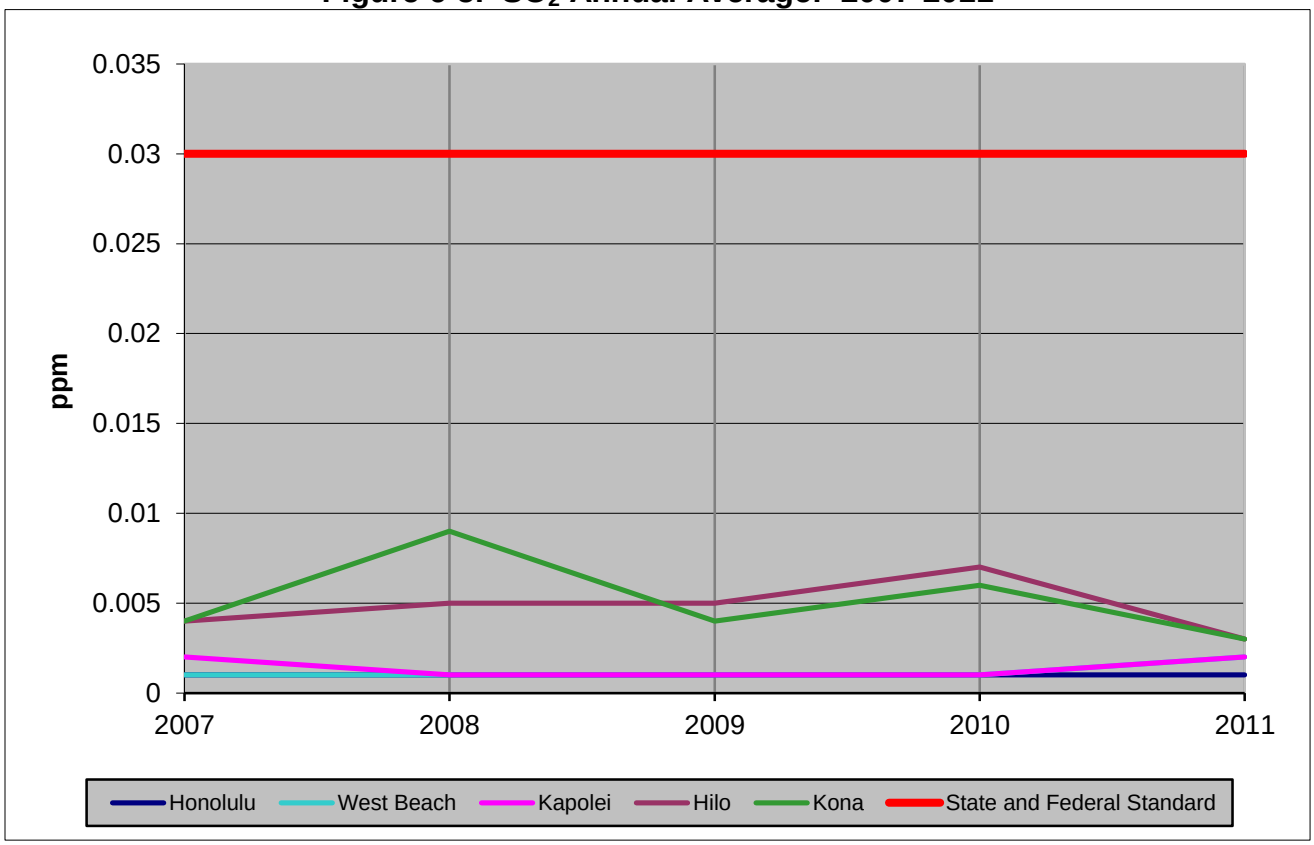


Figure 6-6. SO_2 Maximum 24-Hour Average: 2007-2011

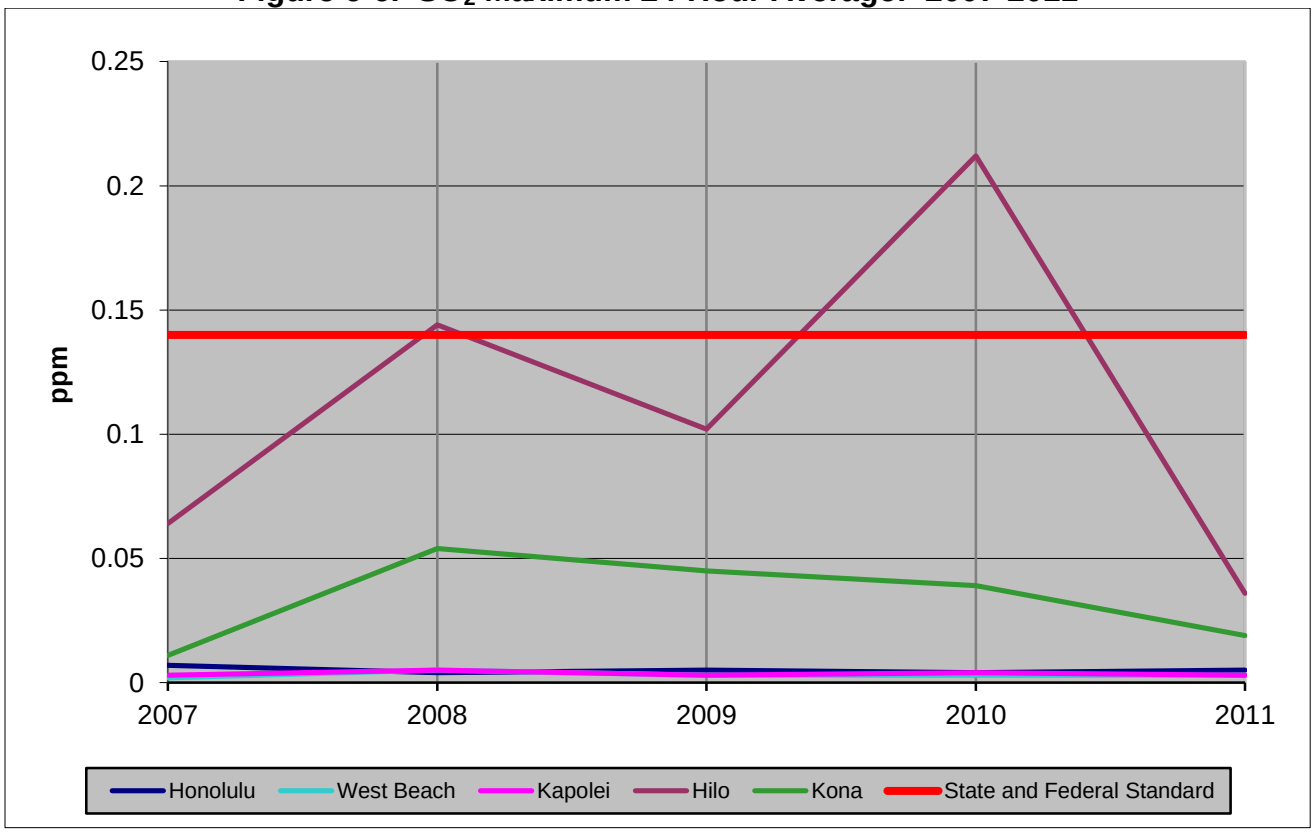


Figure 6-7. NO_2 Annual Average: 2007-2011

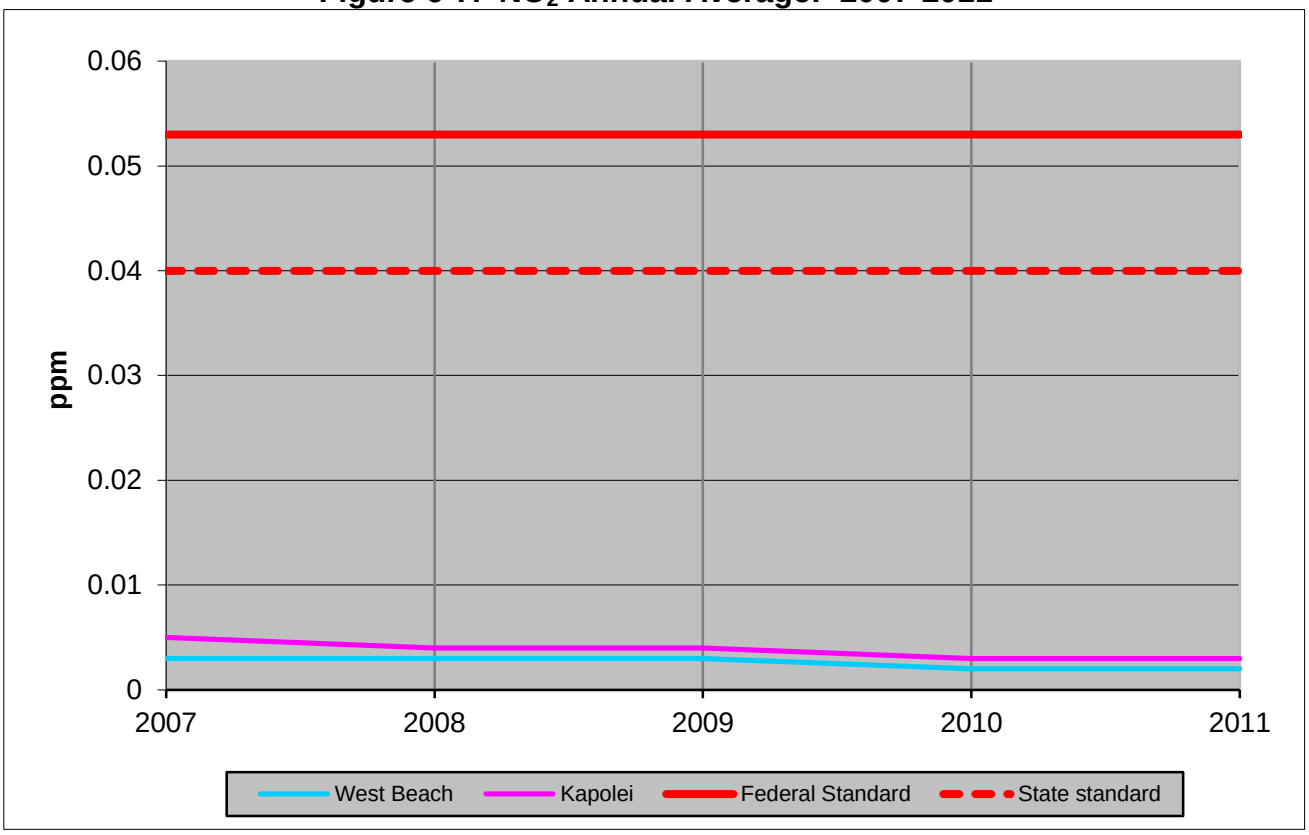


Figure 6-8. NO_2 Maximum 1-Hour Average: 2007-2011

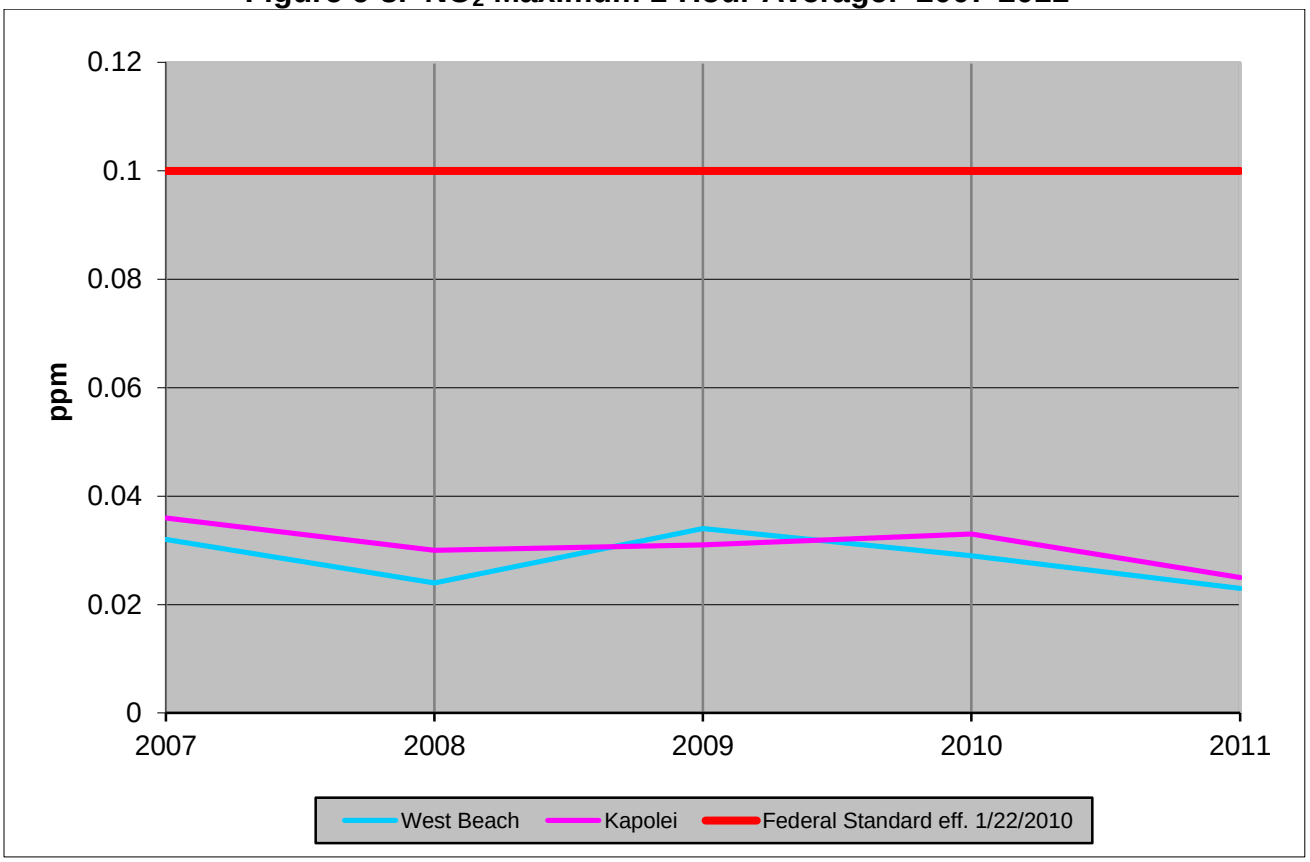


Figure 6-9. O_3 Fourth Highest Daily Maximum 8-Hour Average: 2007-2011

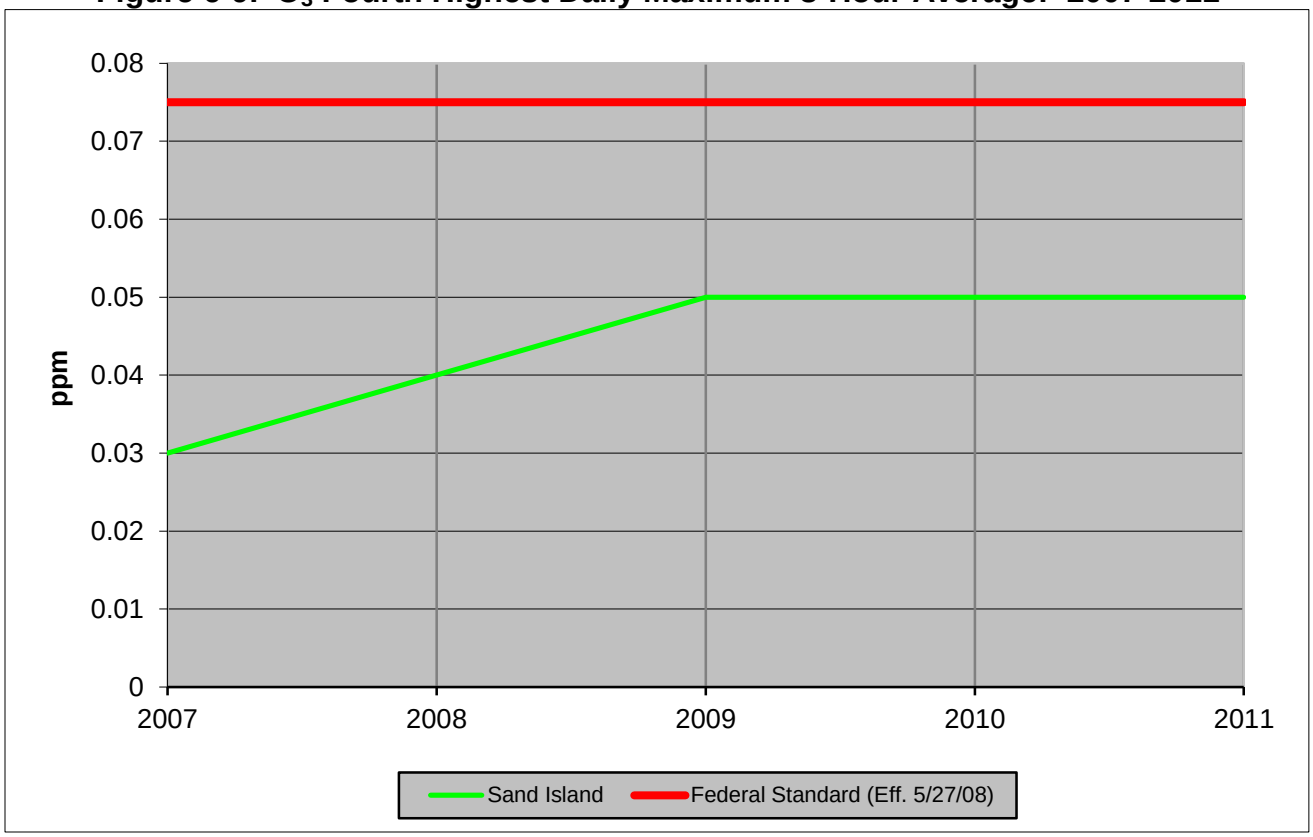


Figure 6-10. CO Maximum 1-Hour Average: 2007-2011

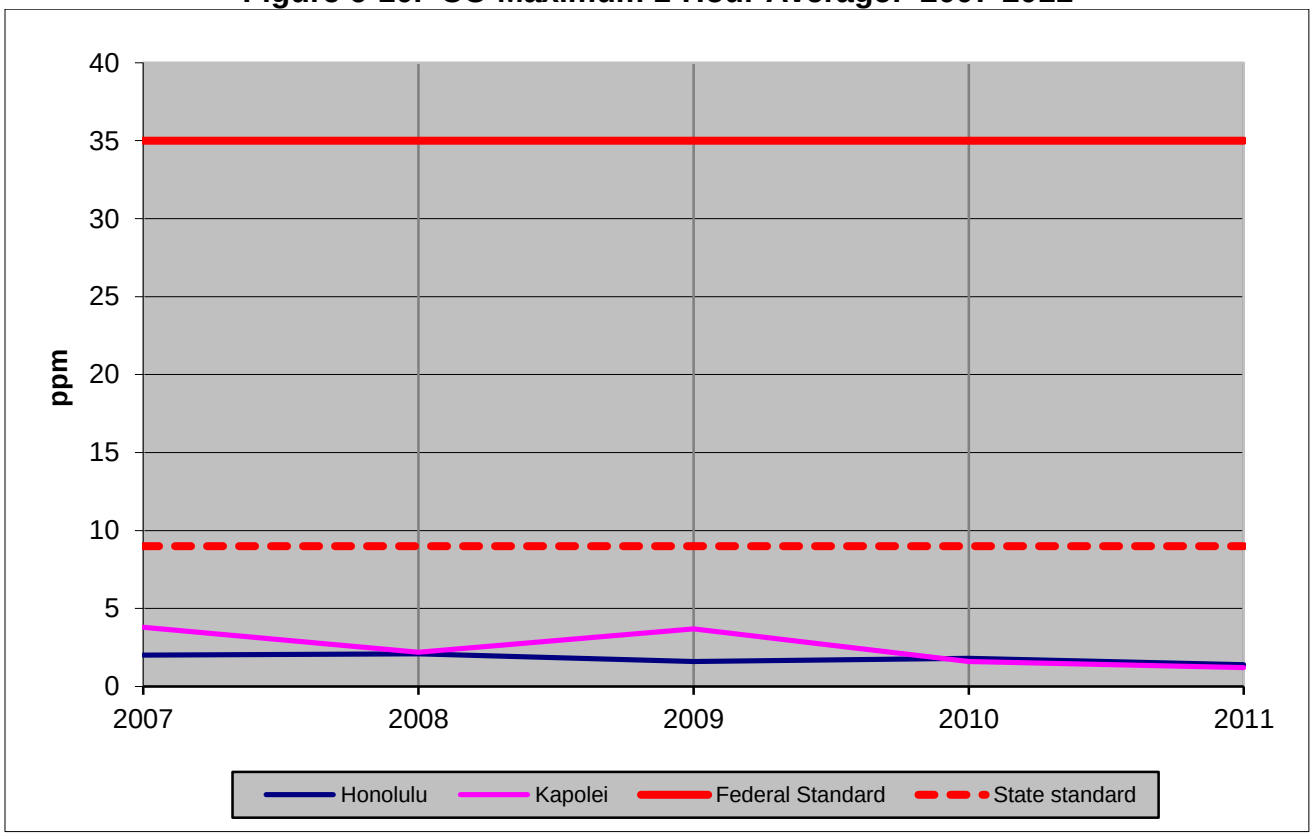


Figure 6-11. CO Maximum 8-Hour Average: 2007-2011