State of Hawaii
Annual Summary
2010
Air Quality Data

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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 seven criteria pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate matter (PM_{10} and $PM_{2.5}$). Hawaii also has 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 air quality standards are met. Station maintenance and data collection is conducted 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 and air toxics monitoring programs. The EPA determined that speciation was essential for establishing a relationship between particle concentrations and adverse health effects. The data provides valuable information in characterizing aerosols, determining the effectiveness of control strategies, and understanding the effects of particle pollution on atmospheric and regional haze. Toxic air pollutants are substances determined to be hazardous to human health and cause adverse ecological effects. The speciation monitor is located at the Kapolei monitoring station and the air toxics monitor is at the Pearl City station.

Air pollution comes from 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. Throughout 2010, the state maintained 14 air monitoring stations on 3 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 state's ambient air monitoring network is reviewed annually and relocations, additions and/or closures may occur as needed.

This report summarizes the air pollutant data collected at the 14 monitoring stations during calendar year 2010. Summaries compare and show attainment or non-attainment of pollutant concentrations with federal or state ambient air quality standards. Monthly maximum concentrations for each pollutant and averaging period as well as speciation and air toxics data are also displayed. Five-year trend summaries of criteria pollutants 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 the 2008 and 2009 books 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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The Department of Health provides access to its programs and activities without regard to race, color, national origin (including language), age, sex, religion, or disability. Write our Affirmative Action Officer at P.O. Box 3378, Honolulu, Hawaii 96801-3378, or call (808)-586-4616 (voice) within 180 days of a problem.

Cover photo is a view of Hanalei Bay on the island of Kauai.

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.
Air Toxics	Also known as hazardous air pollutants, these are pollutants known or suspected to cause adverse health effects if exposed at sufficient concentrations and durations.
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 United States Environmental Protection Agency. A federal 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.
$\mu g/m^3$	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 [d] (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.

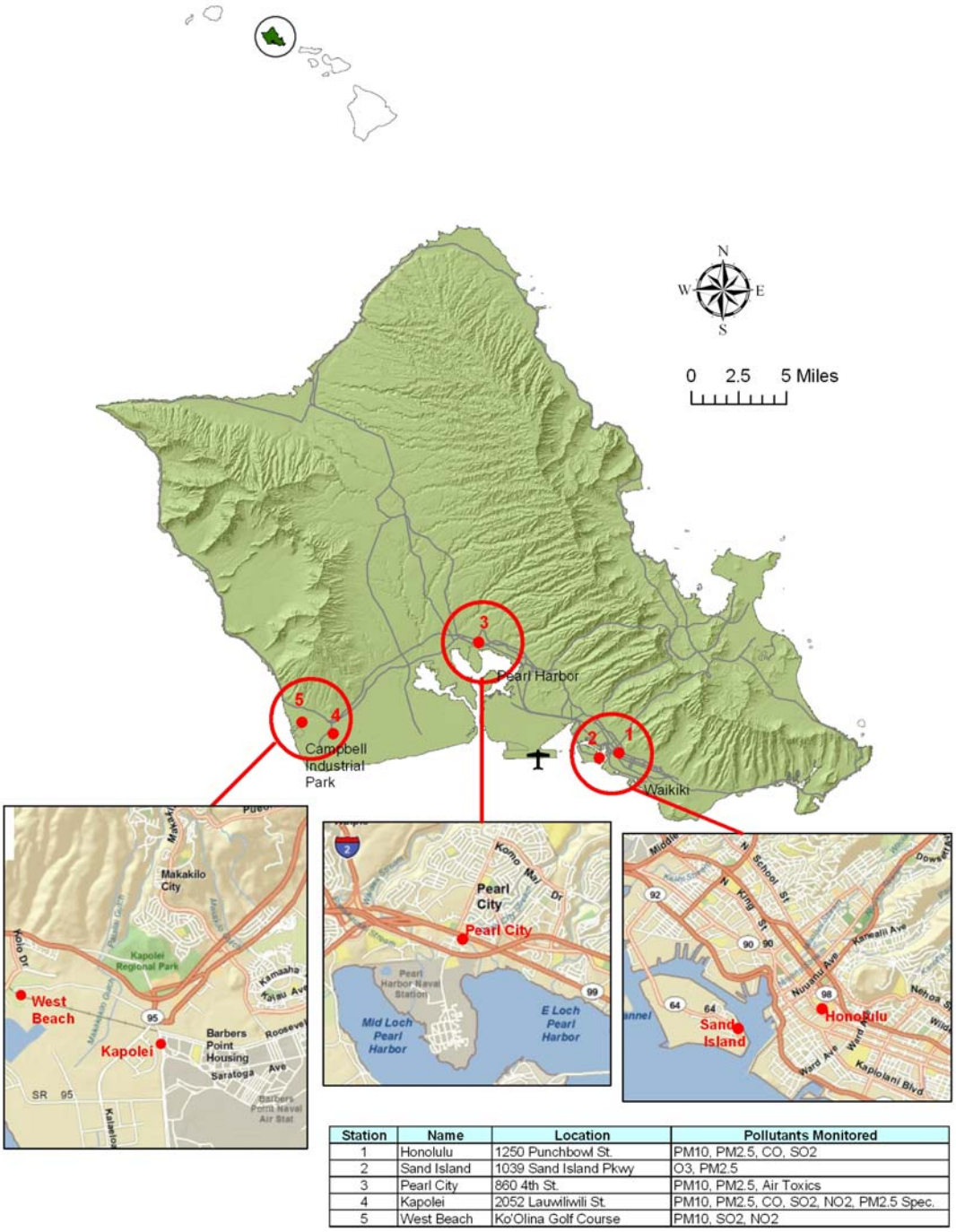
d Due to almost non-detectable levels, ambient air monitoring for lead was discontinued in October 1997 with EPA approval. However, since 2003 lead continues to be measured as part of the Air Toxics monitoring program.

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.	PM10, PM2.5, CO, SO2
2	Sand Island	1039 Sand Island Pkwy	O3, PM2.5
3	Pearl City	860 4th St.	PM10, PM2.5, Air Toxics
4	Kapolei	2052 Lauwiliwili St.	PM10, PM2.5, CO, SO2, NO2, PM2.5 Spec.
5	West Beach	Ko'Olina Golf Course	PM10, SO2, NO2

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
	Established:	July 2002
	Brief Description:	
	Located in the Kapolei Business Park, north of Campbell Industrial Park and 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}, $PM_{2.5}$, Air Toxics
	Established:	May 1079
	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.	

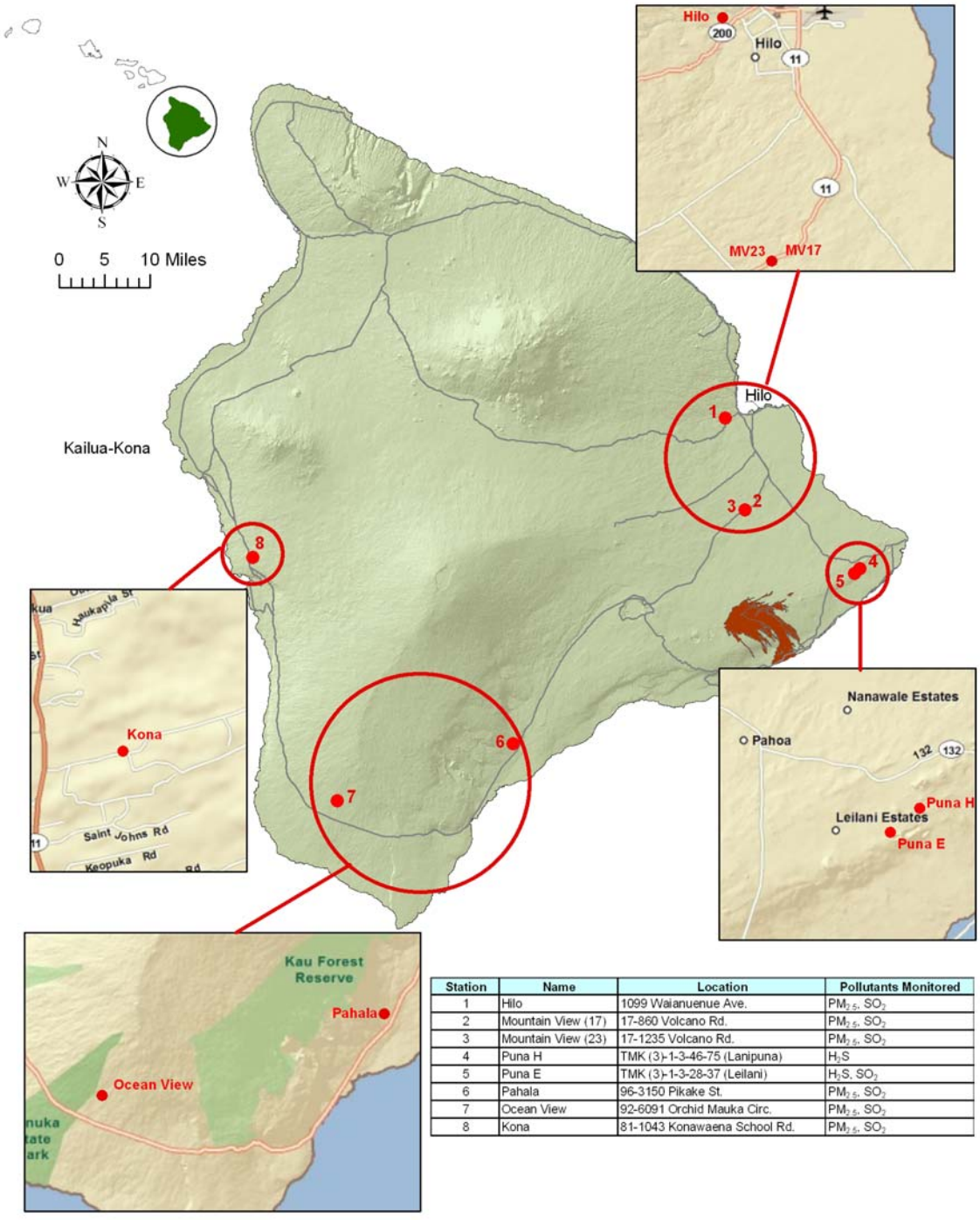
West Beach (WB)		
	**Location:**	Ko'Olina Golf Course, Kapolei
	Latitude:	21.33274
	Longitude:	-158.11413
	Altitude:	14.5 m
	Parameters:	SO_2, NO_2, PM_{10}
	Established:	February 1991
	Brief Description:	
	Within the Ko'Olina resort and residential community next to the Ko'Olina golf course and approximately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

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

Station	Name	Location	Pollutants Monitored
1	Kihei	Hale Piilani Park	PM2.5

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)	17-860 Volcano Rd.	$PM_{2.5}$, SO_2
3	Mountain View (23)	17-1235 Volcano Rd.	$PM_{2.5}$, SO_2
4	Puna H	TMK (3)-1-3-46-75 (Lanipuna)	H_2S
5	Puna E	TMK (3)-1-3-28-37 (Leilani)	H_2S, SO_2
6	Pahala	96-3150 Pikake St.	$PM_{2.5}$, SO_2
7	Ocean View	92-6091 Orchid Mauka Circ.	$PM_{2.5}$, SO_2
8	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 17 (MV17)		
	**Location:**	17-860 Volcano Rd. Mt. View
	Latitude:	19.56983
	Longitude:	-155.08065
	Altitude:	354 m
	Parameters:	SO_2, $PM_{2.5}$
	Established:	December 2007
	Brief Description:	
	This station was established to monitor vog during southerly wind conditions. The station was closed 10/27/10 and moved to Mt. View Elementary School, approximately 1 mile south.	

Mt. View 23 (MV23)		
	**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 Circlc, 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.	

Puna H (PH)		
	**Location:**	TMK (3)-1-3-46:75, Pahoa
	Latitude:	19.47183
	Longitude:	-154.88903
	Altitude:	200 m
	Parameters:	H_2S
	Established:	November 2002
	Brief Description:	
	Located in the Lanipuna Gardens subdivision, this station monitors for emissions from the geothermal energy facility approximately 0.4 mile to the north.	

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	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 17[2]	-	SPM	-	-	SPM	-	-	Source Impact	Urban
Mountain View 23[3]	-	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
Puna H	-	-	-	-	-	-	SPM	Source Impact (geothermal)	Agricultural

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] Mt. View 17 closed 10/27/10
[3] Mt. View 23 began operating 12/7/10

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

Monitoring Station	PM_{10} Continuous Monitor (BAMS)	$PM_{2.5}$ Manual Particulate Monitor	$PM_{2.5}$ Continuous Monitor (BAMS)	CO Continuous Gas Filter Correlation Analyzer	SO_2 Continuous Pulsed Fluorescence Analyzer	O_3 Continuous UV Photometric Analyzer	NO_2 Continuous Chemiluminescence Analyzer	H_2S Continuous Pulsed Fluorescence Analyzer
OAHU Honolulu	✓		✓	✓	✓			
Kapolei	✓	✓	✓	✓	✓		✓	
Pearl City	✓		✓					
Sand Island			✓			✓		
West Beach	✓				✓		✓	
MAUI Kihei			✓					
HAWAII Hilo			✓		✓			
Kona			✓		✓			
Mt. View 17			✓		✓			
Mt. View 23			✓		✓			
Ocean View			✓		✓			
Pahala			✓		✓			
Puna E					✓			✓
Puna H								✓

Section 4
2010 AIR QUALITY DATA

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. The Air Surveillance and Analysis Section in the State Laboratories Division validates data collected from the monitoring stations and ensures that it 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 occasional exceedances of the NAAQS for those pollutants. 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.

Similarly, during the New Year's fireworks celebration, the $PM_{2.5}$ NAAQS was exceeded at two monitoring stations. Use of fireworks is an exceptional event and as with the volcano, the state is requesting exclusion of these exceedances from attainment/non-attainment determination.

Excluding the exceedances due to the volcano and fireworks, in 2010 the state of Hawaii was in attainment with 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);
- "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;
- "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 valid periods divided by the possible periods;
- Attainment with the NAAQS is determined according to 40 CFR 50.

Explanation of Figures 4-1 to 4-13 and Tables 4-19 to 4-28:

Data and graphs show the maximum value recorded in each month at each station for the pollutant averaging period compared to the federal and state standards.

Table 4-1. 2010 Summary of 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	63 [1]	57	12	0	0	0	0	0	0	0	0	0	0	0	0	365	365	100
Kapolei	59	58	15.5	0	0	0	0	0	0	0	0	0	0	0	0	365	349	95.6
Pearl City	70 [1]	58 [1]	19	0	0	0	0	0	0	0	0	0	0	0	0	365	356	97.5
West Beach	92	70	13.9	0	0	0	0	0	0	0	0	0	0	0	0	365	360	98.6

[1] New Year's fireworks

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

Station	Exceedances in 2008	Exceedances in 2009	Exceedances in 2010	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 is not to be exceeded more than once per year on average over 3 years.
In 2010, Hawaii was in attainment with the 24-hour PM_{10} NAAQS.

Table 4-3. 2010 Summary of 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	49.7[1]	12.2	4.7	1[1]	0	0	0	0	0	0	0	0	0	0	0	365	361	98.9
Kapolei	61.0[1]	11.8	4.3	1[1]	0	0	0	0	0	0	0	0	0	0	0	365	357	97.8
Pearl City	34.8[1]	13.1	4.4	0	0	0	0	0	0	0	0	0	0	0	0	365	358	98.1
Sand Island	29.9	17.3	10[2]	0	0	0	0	0	0	0	0	0	0	0	0	365	308	84.4
MAUI																		
Kihei	23.5	13.8	4.8	0	0	0	0	0	0	0	0	0	0	0	0	365	332	91

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

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

Station	2008 98th value	2009 98th value	2010 98th value	3-Year Average	Sites in violation of the NAAQS
Honolulu	13	14	12	13	0
Kapolei	21	12	12	15	0
Pearl City	13	12	13	13	0
Sand Island	13	13	17	14	0
Kihei	15	16	14	15	0

Attainment: The 3-year average of the 98th percentile values must be less than or equal to 35 µg/m^3.
In 2010, 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	2008 Ann. Ave	2009 Ann. Ave	2010 Ann. Ave	3-Year Average	Sites in violation of the NAAQS
Honolulu	4.7	5.0	4.7	4.8	0
Kapolei	4.9	5.4	4.3	4.9	0
Pearl City	4.5	4.9	4.4	4.6	0
Sand Island	5.7	6.9	10	7.5	0
Kihei	5.5	3.8	4.8	4.7	0

Attainment: The 3-year average of annual mean values must be less than 15 µg/m^3.
In 2010, Hawaii was in attainment with the annual $PM_{2.5}$ NAAQS.

Table 4-6. 2010 Summary of 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	34.8	25.2	5	0	0	0	0	0	0	0	0	0	0	0	0	365	324	89
Kona	63	35.1	18.2	5	1	0	0	0	0	0	0	0	0	0	0	365	359	98
Mt. View 17	42.5	33.5	5.3[1]	4	0	0	0	0	0	0	0	0	0	-	-	299	292	98
Mt. View 23	14.7	14.7	5.7[1]	-	-	-	-	-	-	-	-	-	-	-	0	24	24	100
Ocean View	35.5	30.7	16.1[1]	-	-	-	0	1	0	0	0	0	0	0	0	275	261	95
Pahala	47.2	26.4	8.3	3	0	0	0	0	0	0	0	0	0	0	0	365	353	97

These special purpose stations were established to monitor ambient air concentrations of $PM_{2.5}$ from volcanic emissions. Volcanic eruptions are considered uncontrollable natural events and therefore EPA may exclude the exceedances of the 24-hour NAAQS from attainment determinations.

[1] Does not meet summary criteria, <75% data recovery. Mt. View17 shutdown 10/27/10, Mt. View23 began on 12/8/10, and Ocean View began 4/1/10

Table 4-7. 2010 Summary of 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	0.052	0.048	0.047	0.026	0	0	0	0	0	0	0	0	0	0	0	0	8755	8730	99.7

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

Station	2008 4th highest	2009 4th highest	2010 4th highest	3-Year Average	Site in violation of the NAAQS
Sand Island	0.043	0.048	0.047	0.046	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 2010, Hawaii was in attainment with the 8-hour O_3 NAAQS.

Table 4-9. 2010 Summary of 1-Hour[1] 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																		
Kapolei	0.033	0.027	0.003	0	0	0	0	0	0	0	0	0	0	0	0	8760	7773	88.7
West Beach	0.029	0.025	0.002	0	0	0	0	0	0	0	0	0	0	0	0	8760	8114	92.6

Attainment of the annual NO_2 NAAQS: The annual mean shall not exceed 0.053 ppm.
In 2010, Hawaii was in attainment with the annual NO_2 NAAQS. [1] EPA will determine Hawaii's attainment status of the new 1-hour NAAQS by January 2012.

Table 4-10. 2010 Summary of 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																		
Honolulu	1.8	1.5	0.4	0	0	0	0	0	0	0	0	0	0	0	0	8760	8699	99.3
Kapolei	1.6	1.5	0.2	0	0	0	0	0	0	0	0	0	0	0	0	8760	7956	90.8

Attainment: 1-hour values not to exceed 35 ppm more than once per year.
In 2010, Hawaii was in attainment with the 1-hour CO NAAQS.

Table 4-11. 2010 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																		
Honolulu	0.8	0.8	0.4	0	0	0	0	0	0	0	0	0	0	0	0	8755	8731	99.7
Kapolei	1.0	0.8	0.2	0	0	0	0	0	0	0	0	0	0	0	0	8755	8344	95.3

Attainment: 8-hour values not to exceed 9 ppm more than once per year.
In 2010, Hawaii was in attainment with the 8-hour CO NAAQS.

Table 4-12. 2010 Summary of 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	0.010	0.010	0.001	0	0	0	0	0	0	0	0	0	0	0	0	2920	2869	98.3
Kapolei	0.012	0.011	0.001	0	0	0	0	0	0	0	0	0	0	0	0	2920	2447	83.8
West Beach	0.009	0.008	0.001	0	0	0	0	0	0	0	0	0	0	0	0	2920	2506	85.8
HAWAII	**SPM stations (see NOTE)**																	
Hilo	0.742	0.715	0.007	2	1	0	0	0	0	0	0	0	0	0	0	2920	2540	87
Kona	0.150	0.095	0.006	0	0	0	0	0	0	0	0	0	0	0	0	2920	2625	90
Mt. View 17	0.960	0.850	0.006	4	0	0	0	0	0	0	0	0	0	-	-	2392	2162	90
Mt. View 23	0.110	0.090	0.013	-	-	-	-	-	-	-	-	-	-	-	0	192	183	95
Ocean View	0.550	0.430	0.02	-	-	-	0	0	0	0	0	0	0	0	0	2200	2014	92
Pahala	1.0	1.0	0.073	14	2	3	0	3	2	1	0	0	0	0	1	2920	2744	94
Puna E	0.119	0.055	0.001	0	0	0	0	0	0	0	0	0	0	0	0	2920	2752	94

Attainment: 3-hour values not to exceed 0.500 ppm more than once per year.
In 2010, Hawaii was in attainment with the 3-hour SO_2 NAAQS (SLAMS stations only).

NOTE: The SPM stations 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.

Table 4-13. 2010 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	0.004	0.003	0.001	0	0	0	0	0	0	0	0	0	0	0	0	365	365	100
Kapolei	0.004	0.004	0.001	0	0	0	0	0	0	0	0	0	0	0	0	365	352	96.4
West Beach	0.003	0.003	0.001	0	0	0	0	0	0	0	0	0	0	0	0	365	361	98.9
HAWAII	**SPM Stations (see NOTE)**																	
Hilo	0.212	0.144	0.007	1	0	0	0	0	0	0	0	0	0	0	0	365	340	93
Kona	0.039	0.034	0.006	0	0	0	0	0	0	0	0	0	0	0	0	365	344	94
Mt. View 17	0.220	0.220	0.006	4	0	0	0	0	0	0	0	0	0	-	-	299	288	96
Mt. View 23	0.030	0.030	0.013	-	-	-	-	-	-	-	-	-	-	-	0	24	24	100
Ocean View	0.148	0.120	0.020	-	-	-	1	0	0	0	0	0	0	0	0	275	258	94
Pahala	0.519	0.397	0.073	8	7	12	0	7	2	2	0	1	1	0	0	365	351	96
Puna E	0.025	0.018	0.001	0	0	0	0	0	0	0	0	0	0	0	0	365	363	99

Attainment: 24-hour values not to exceed 0.14 ppm more than once per year.
In 2010, 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. 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 2010, 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. Volcanic eruptions are considered natural events and therefore EPA may exclude the exceedances of the annual NAAQS from attainment determinations.

Table 4-14. 2010 Summary of Rolling 3-month Pb Averages

	Maximum		Annual Mean	No. of 3-month Averages Greater than 0.15 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																		
Pearl City	0.0041	0.0038	0.0012	0	0	0	0	0	0	0	0	0	0	0	0	61	60	98.4
Rolling 3-month average is the mean value of the current month and the previous two months.																		
Attainment: The maximum 3-month rolling average in the past 38 months not to exceed 0.15 µg/m^3. (The maximum 3-month rolling average in the past 38 month period beginning November 2007 and ending December 2010 was 0.0096 µg/m^3) **In 2010, Hawaii was in attainment of the Pb NAAQS.**																		

Table 4-15. 2010 Summary of 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	0.006	0.005	0.002	0	0	0	0	0	0	0	0	0	0	0	0	8760	7978	91
Puna H	0.019	0.015	0.002	0	0	0	0	0	0	0	0	0	0	0	0	8760	7656	87
Attainment of the state standard: 1-hour values not to exceed 0.025 ppm. **In 2010, Hawaii was in attainment of the state 1-hour H_2S standard.**																		

Figure 4-1. 2010 Monthly Maximum 24-Hour PM_{10} Averages

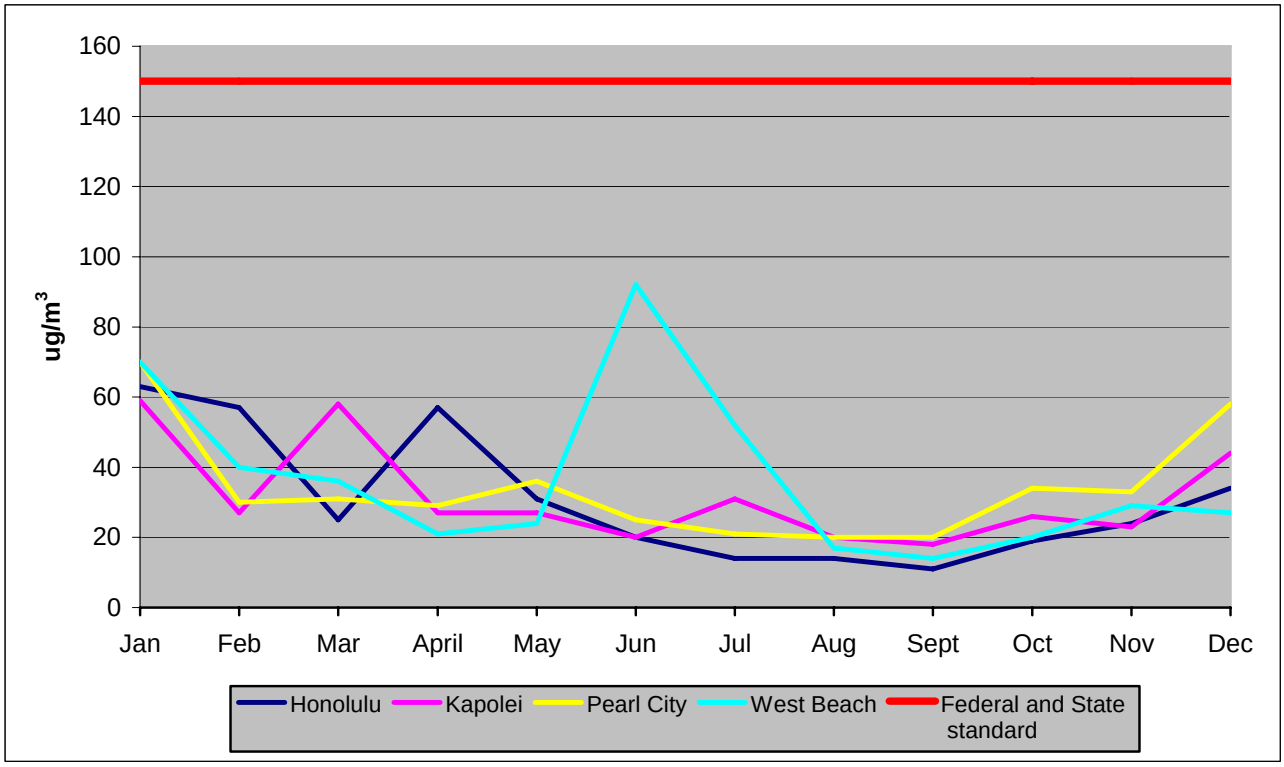


Table 4-16. 2010 Monthly Maximum 24-Hour PM_{10} Values (µg/m^3)

	Honolulu	Kapolei	Pearl City	West Beach
Jan	63	59	70	70
Feb	57	27	30	40
Mar	25	58	31	36
Apr	57	27	29	21
May	31	27	36	24
June	20	20	25	92
Jul	14	31	21	52
Aug	14	20	20	17
Sept	11	18	20	14
Oct	19	26	34	20
Nov	24	23	33	29
Dec	34	44	58	27

State and Federal standard: 150 µg/m^3

Values in red occurred during the New Year's fireworks celebrations on January 1 and December 31.

Figure 4-2. 2010 Monthly Maximum 24-Hour $PM_{2.5}$ Averages: SLAMS Stations

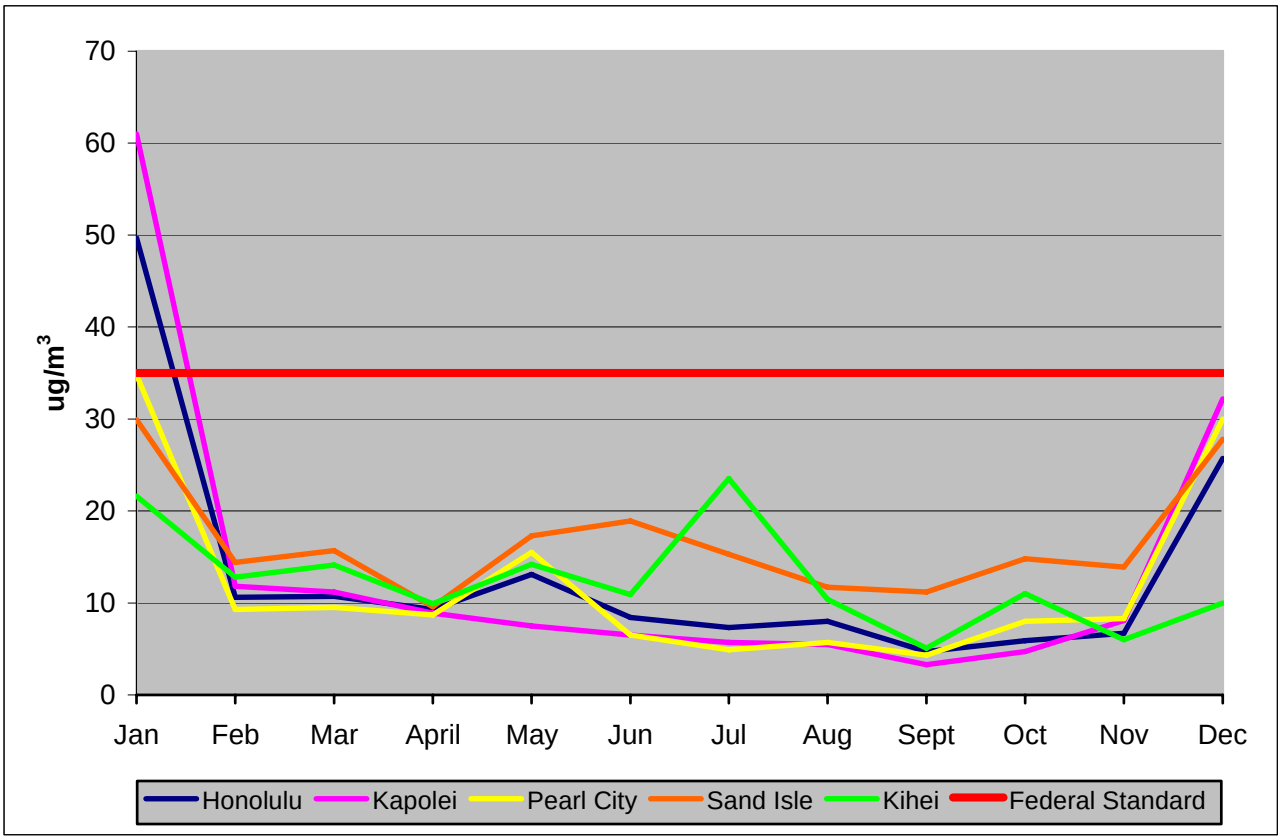


Table 4-17. 2010 Monthly Maximum 24-Hour $PM_{2.5}$ Values (µg/m^3): SLAMS

	Honolulu	Kapolei	Pearl City	Sand Island	Kihei
Jan	49.7	61	34.8	29.9	21.6
Feb	10.6	11.8	9.3	14.4	12.8
Mar	10.7	11.2	9.5	15.7	14.1
Apr	9.3	8.9	8.7	9.6	9.9
May	13.1	7.5	15.5	17.3	14.2
June	8.4	6.5	6.5	18.9	10.9
Jul	7.3	5.7	4.9	15.3	23.5
Aug	8	5.5	5.7	11.7	10.4
Sept	4.7	3.3	4.3	11.2	5.1
Oct	5.9	4.7	8	14.8	11
Nov	6.7	8.1	8.3	13.9	6
Dec	25.7	32.2	30	27.8	10

Federal standard: 35 µg/m^3

Values in red occurred during the New Year's fireworks celebrations on January 1 and December 31. Exceptional event documentation has been submitted to EPA for the exceedances at the Honolulu and Kapolei stations that occurred on January 1, 2010.

Figure 4-3. 2010 Monthly Maximum 24-Hour $PM_{2.5}$ Averages: SPM Stations

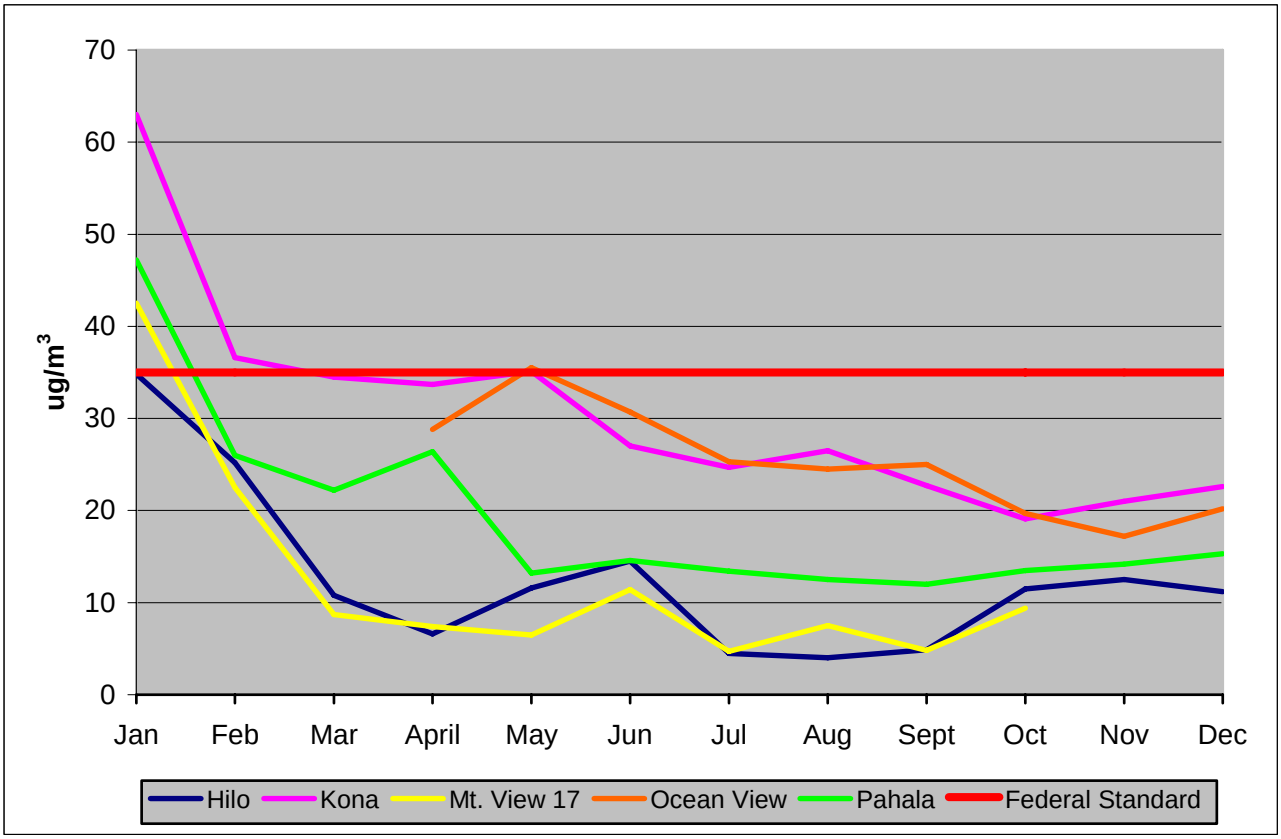


Table 4-18. 2010 Monthly Maximum 24-Hour $PM_{2.5}$ Values (µg/m^3): SPM

	Hilo	Kona	Mt. View 17	Ocean View	Pahala
Jan	34.8	63	42.5	station not estab.	47.2
Feb	25.2	36.6	22.5	station not estab.	26
Mar	10.8	34.5	8.7	station not estab.	22.2
Apr	6.6	33.7	7.4	28.8	26.4
May	11.6	35.1	6.5	35.5	13.2
June	14.5	27	11.4	30.7	14.6
Jul	4.5	24.7	4.7	25.3	13.4
Aug	4	26.5	7.5	24.5	12.5
Sept	4.9	22.7	4.8	25	12
Oct	11.5	19.1	9.4	19.7	13.5
Nov	12.5	21	station closed	17.2	14.2
Dec	11.2	22.6	station closed	20.2	15.3

Federal standard: 35 µg/m^3

Value in red due to brushfires occurring in the Kona area, near the monitoring station.

These SPM stations were established to monitor the effects of volcanic emissions on the island of Hawaii.

Mt. View 17 shut down on 10/27/10 and Mt. View 23 began operating 12/7/10. The maximum 24-hour $PM_{2.5}$ value for Mt. View 23 in December was 14.8 µg/m^3.

Figure 4-4. 2010 Monthly Maximum 1-Hour NO_2 Averages

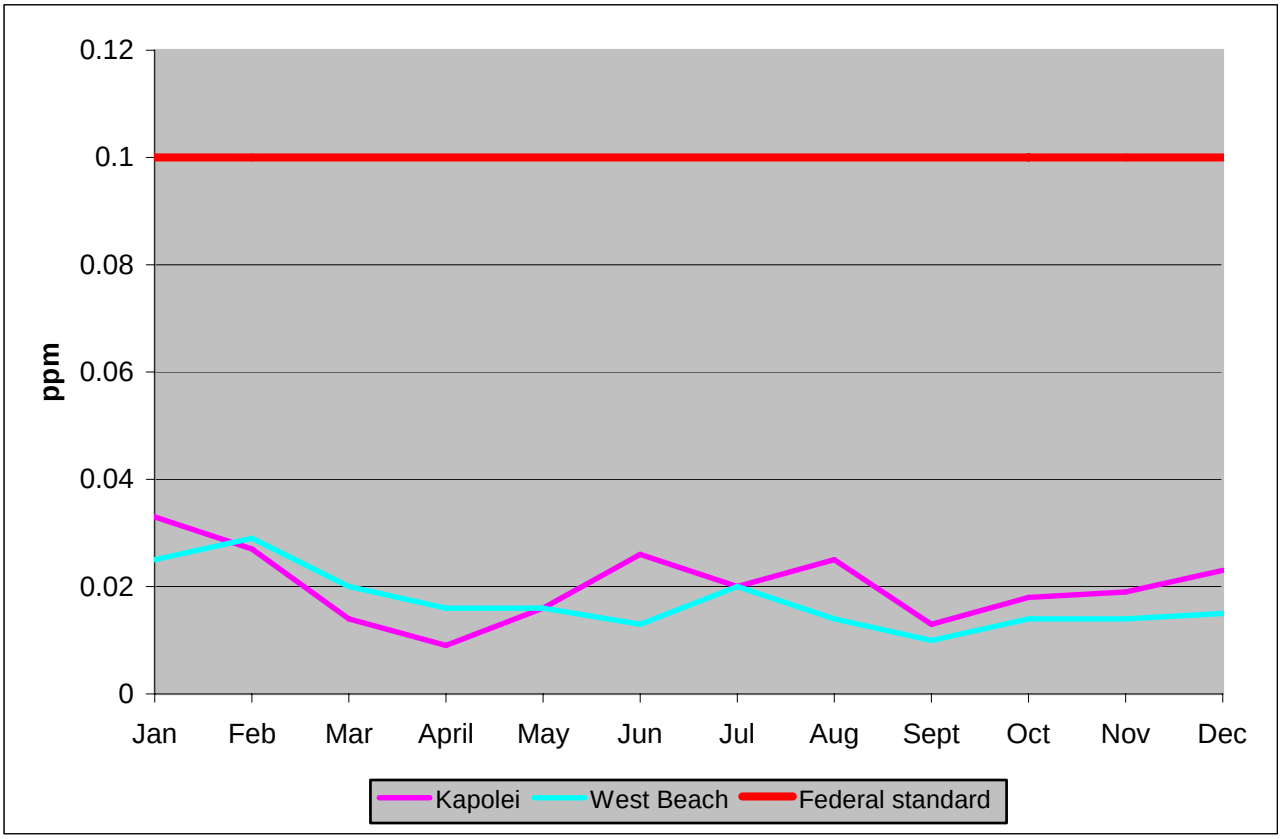


Table 4-19. 2010 Monthly Maximum 1-Hour NO_2 Values (ppm)

	Kapolei	West Beach
Jan	0.033	0.025
Feb	0.027	0.029
Mar	0.014	0.02
Apr	0.009	0.016
May	0.016	0.016
June	0.026	0.013
Jul	0.02	0.02
Aug	0.025	0.014
Sept	0.013	0.01
Oct	0.018	0.014
Nov	0.019	0.014
Dec	0.023	0.015

Federal standard: 0.100 ppm effective January 22, 2010.

Figure 4-5. 2010 Monthly Maximum 1-Hour CO Averages

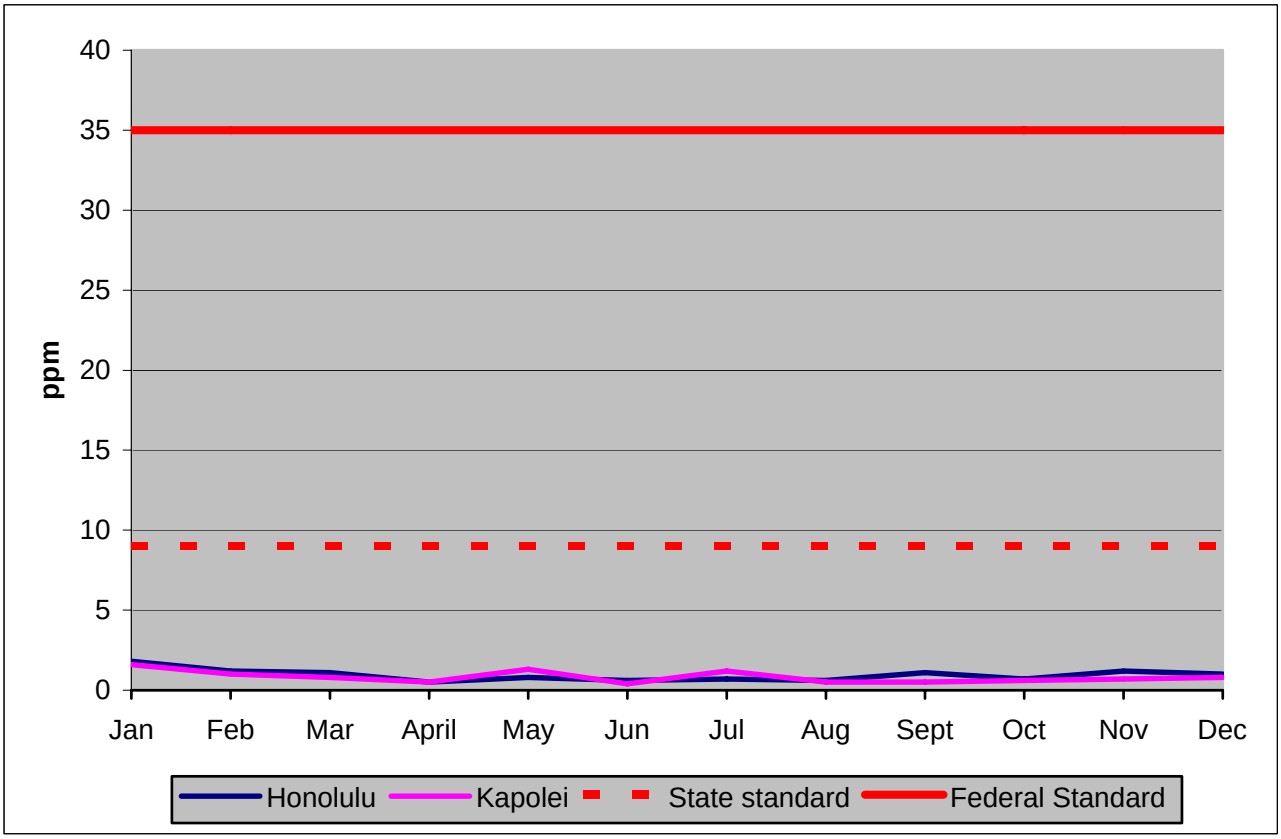


Table 4-20. 2010 Monthly Maximum 1-Hour CO Values (ppm)

	Honolulu	Kapolei
Jan	1.8	1.6
Feb	1.2	1
Mar	1.1	0.8
Apr	0.5	0.5
May	0.8	1.3
June	0.6	0.4
Jul	0.7	1.2
Aug	0.6	0.5
Sept	1.1	0.5
Oct	0.7	0.6
Nov	1.2	0.7
Dec	1	0.8

State standard: 9 ppm

Federal standard: 35 ppm

Figure 4-6. 2010 Monthly Maximum 8-Hour CO Averages

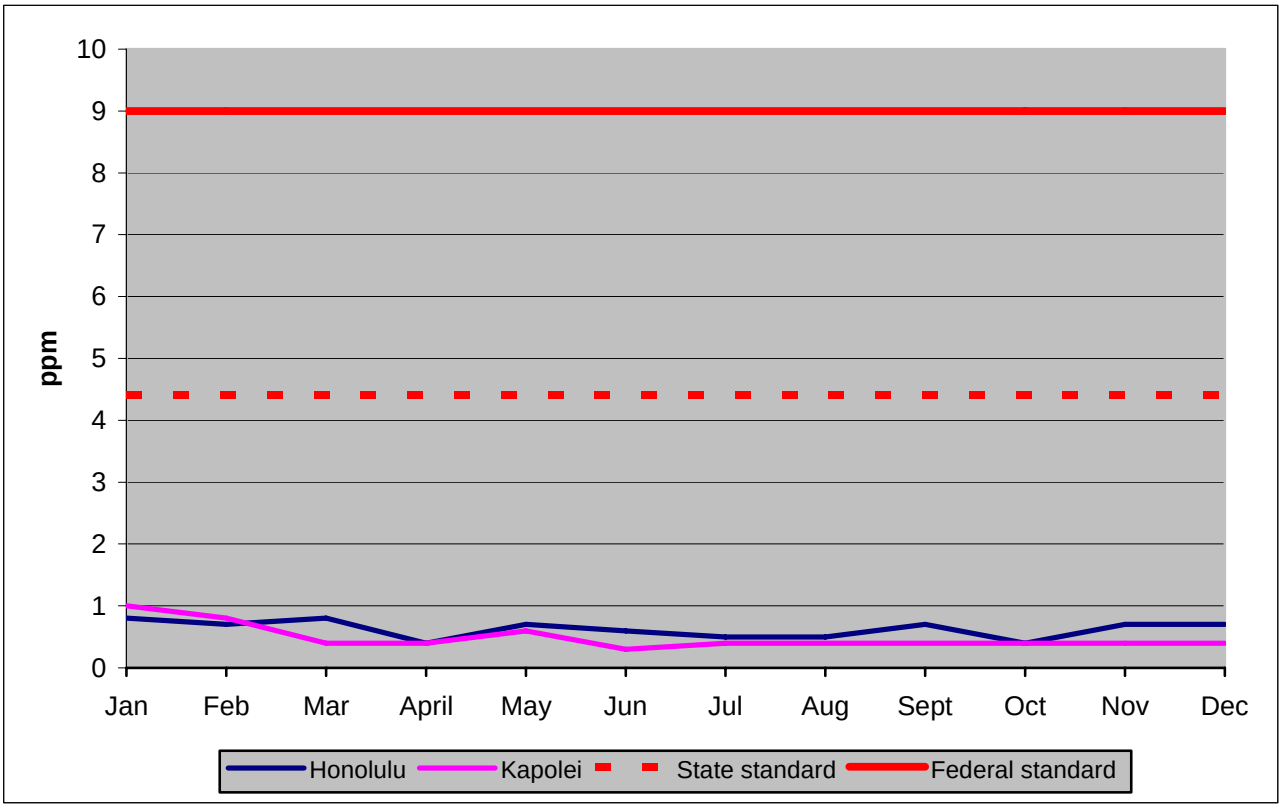


Table 4-21. 2010 Monthly Maximum 8-Hour CO Values (ppm)

	Honolulu	Kapolei
Jan	0.8	1
Feb	0.7	0.8
Mar	0.8	0.4
Apr	0.4	0.4
May	0.7	0.6
June	0.6	0.3
Jul	0.5	0.4
Aug	0.5	0.4
Sept	0.7	0.4
Oct	0.4	0.4
Nov	0.7	0.4
Dec	0.7	0.4

State standard: 4.4 ppm

Federal standard: 9 ppm

Figure 4-7. 2010 Monthly Maximum 8-Hour O_3 Averages

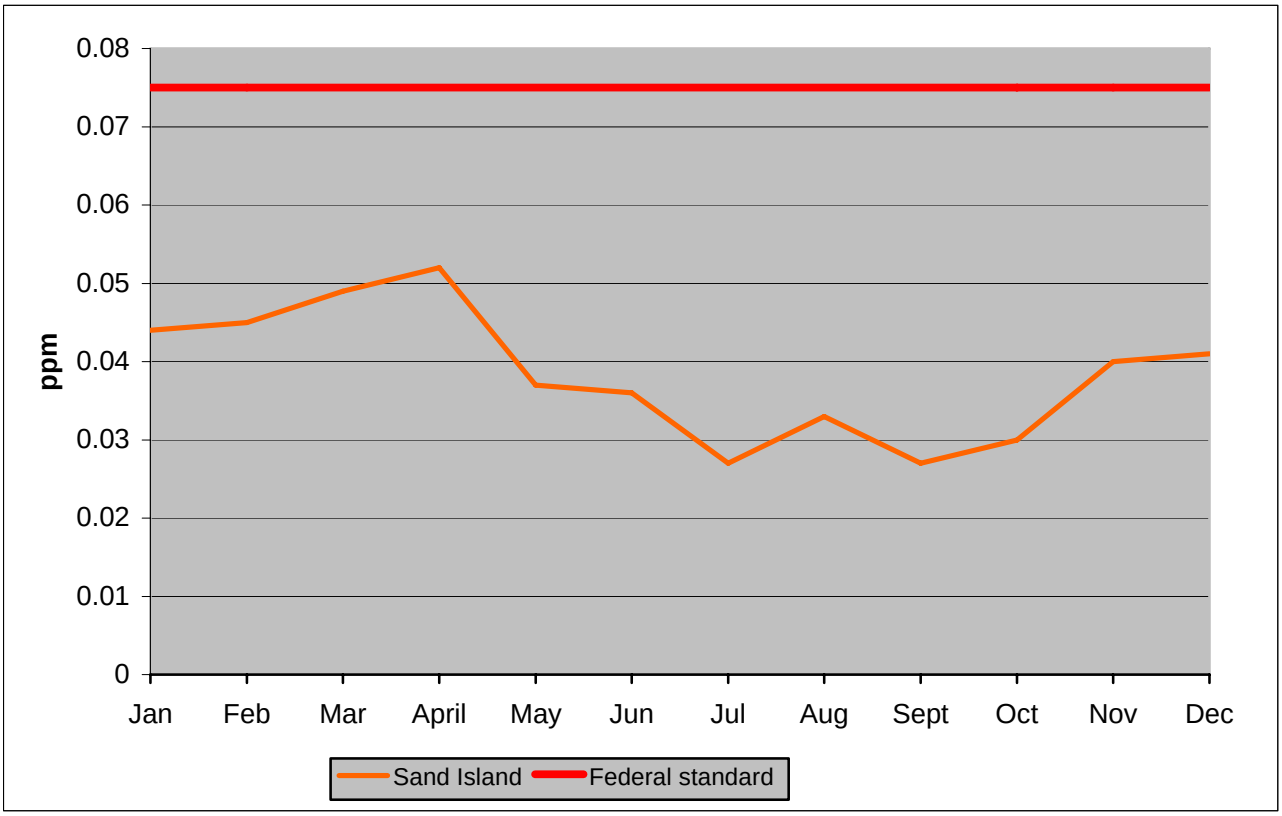


Table 4-22. 2010 Monthly Maximum 8-Hour O_3 Values (ppm)

	Sand Island
Jan	0.044
Feb	0.045
Mar	0.049
Apr	0.052
May	0.037
June	0.036
Jul	0.027
Aug	0.033
Sept	0.027
Oct	0.03
Nov	0.04
Dec	0.041

Federal standard: 0.075 ppm

Figure 4-8. 2010 Monthly Maximum 3-Hour SO_2 Averages: SLAMS Stations

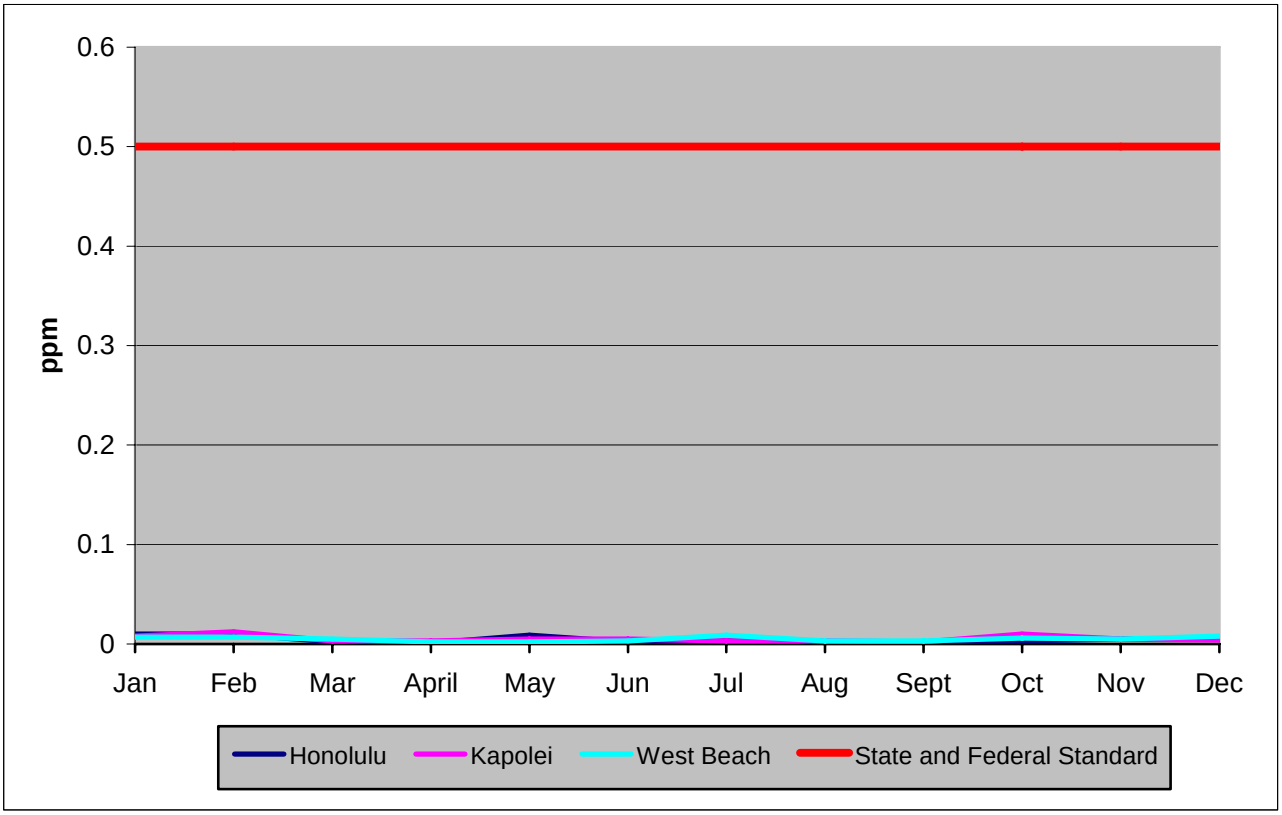


Table 4-23. 2010 Monthly Maximum 3-Hour SO_2 Values (ppm): SLAMS

	Honolulu	Kapolei	West Beach
Jan	0.01	0.008	0.007
Feb	0.01	0.012	0.007
Mar	0.002	0.003	0.005
Apr	0.001	0.003	0.002
May	0.009	0.005	0.002
June	0.002	0.005	0.003
Jul	0.003	0.003	0.009
Aug	0.002	0.003	0.003
Sept	0.002	0.002	0.003
Oct	0.003	0.01	0.006
Nov	0.005	0.005	0.005
Dec	0.005	0.004	0.008

State and Federal standard: 0.500 ppm

Figure 4-9. 2010 Monthly Maximum 3-Hour SO_2 Averages: SPM Stations

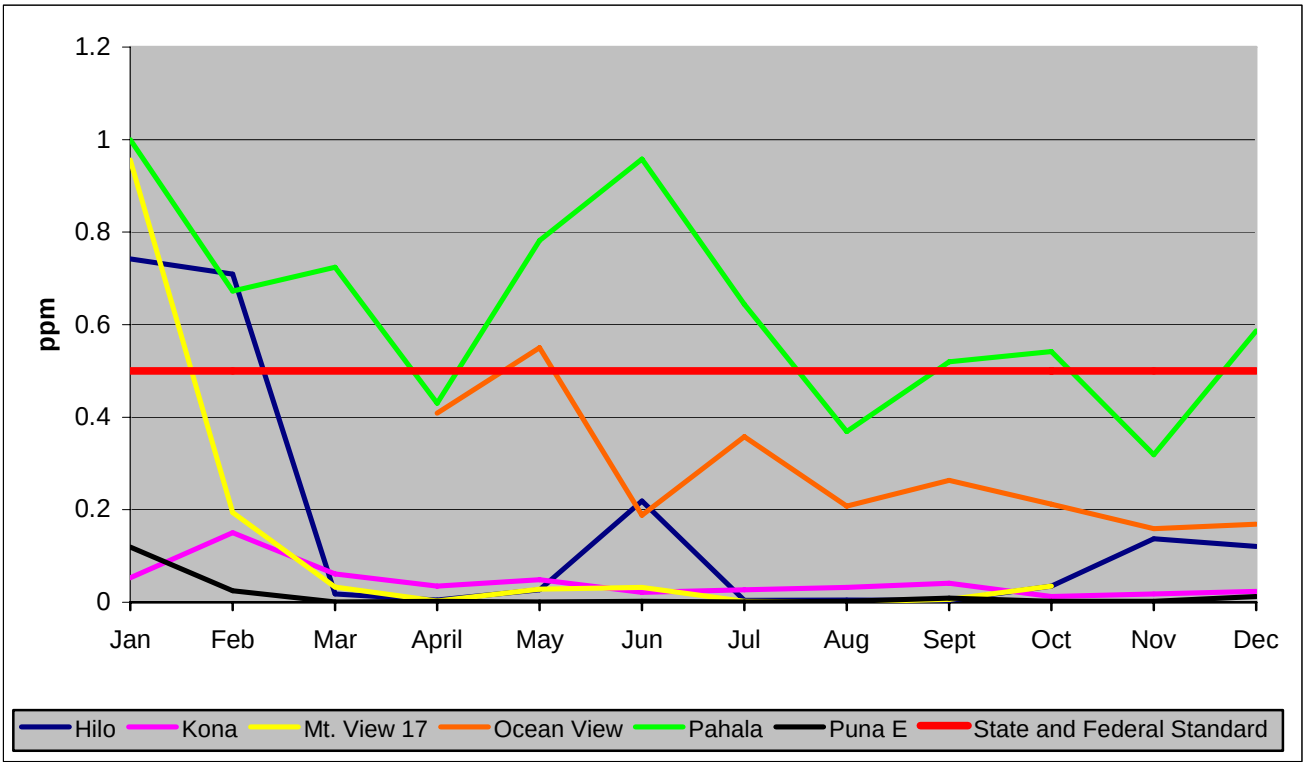


Table 4-24. 2010 Monthly Maximum 3-Hour SO_2 Values (ppm): SPM

	Hilo	Kona	Mt. View 17	Ocean View	Pahala	Puna E
Jan	0.742	0.053	0.956	station not estab.	1.0	0.119
Feb	0.709	0.150	0.194	station not estab.	0.673	0.025
Mar	0.018	0.061	0.033	station not estab.	0.724	0.001
Apr	0.005	0.035	0.003	0.409	0.430	0.002
May	0.027	0.049	0.028	0.550	0.782	0.001
June	0.219	0.021	0.032	0.188	0.958	0.002
Jul	0.004	0.027	0.002	0.358	0.644	0.001
Aug	0.005	0.032	0.001	0.208	0.369	0.002
Sept	0.004	0.041	0.006	0.263	0.520	0.009
Oct	0.035	0.012	0.035	0.212	0.542	0.002
Nov	0.137	0.018	station closed	0.159	0.319	0.002
Dec	0.121	0.023	station closed	0.169	0.586	0.012

State and Federal standard: 0.500 ppm

These SPM stations were established to monitor the effects of volcanic emissions on the island of Hawaii. Hilo and Kona are SLAMS stations.
Mt. View 17 shut down on 10/27/10 and Mt. View 23 began operating 12/7/10. The maximum 3-hour SO_2 value for Mt. View 23 in December was 0.107 ppm.

Figure 4-10. 2010 Monthly Maximum 24-Hour SO_2 Averages: SLAMS Stations

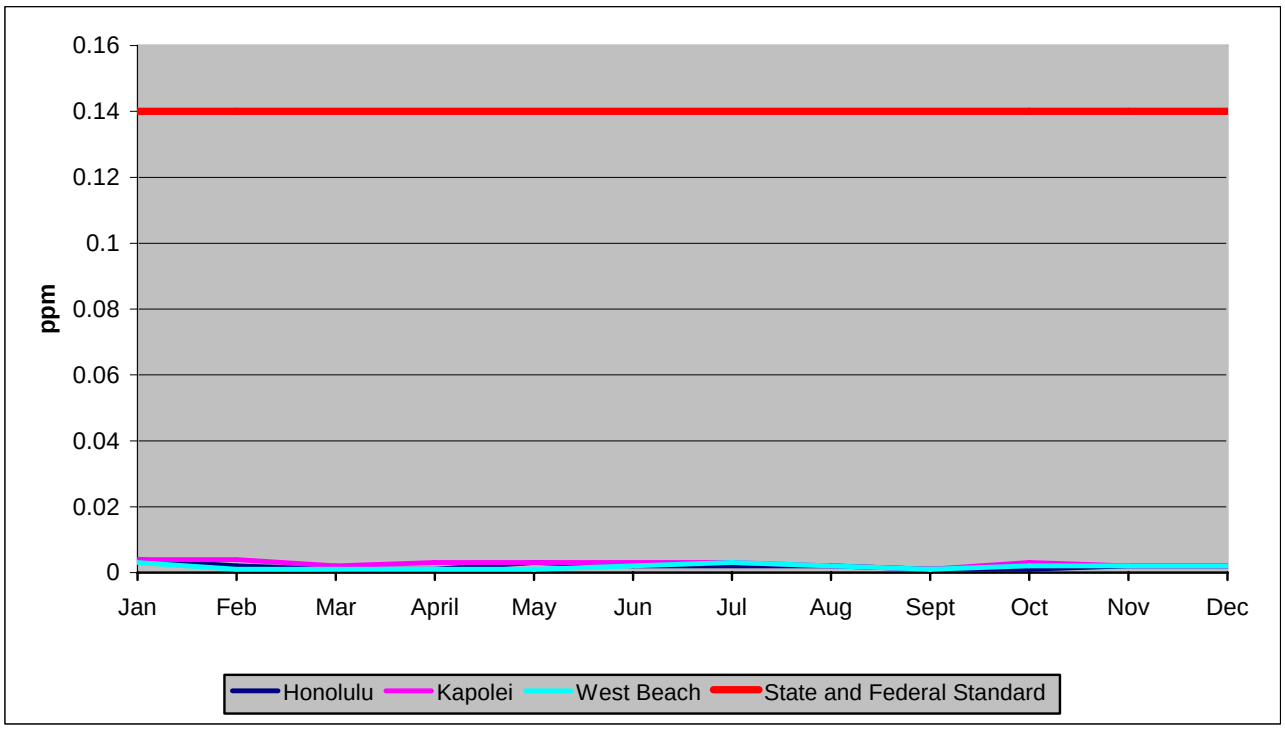


Table 4-25. 2010 Monthly Maximum 24-Hour SO_2 Values (ppm): SLAMS

	Honolulu	Kapolei	West Beach
Jan	0.004	0.004	0.003
Feb	0.002	0.004	0.001
Mar	0.001	0.002	0.001
Apr	0.001	0.003	0.001
May	0.003	0.003	0.001
June	0.002	0.003	0.002
Jul	0.002	0.003	0.003
Aug	0.002	0.002	0.002
Sept	0.001	0.001	0.001
Oct	0.001	0.003	0.002
Nov	0.002	0.002	0.002
Dec	0.002	0.002	0.002

State and Federal standard: 0.140 ppm

Figure 4-11. 2010 Monthly Maximum 24-Hour SO_2 Averages: SPM Stations

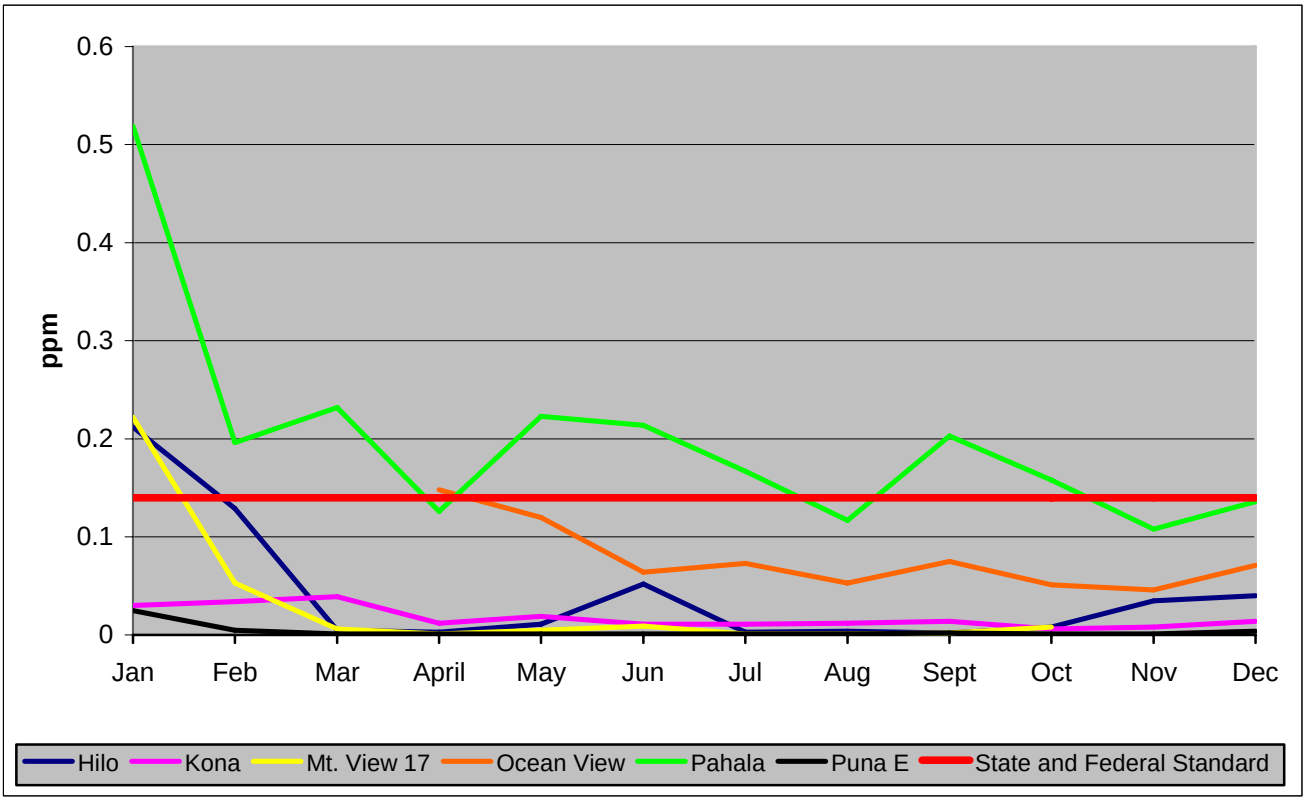


Table 4-26. 2010 Monthly Maximum 24-Hour SO_2 Values (ppm): SPM

	Hilo	Kona	Mt. View 17	Ocean View	Pahala	Puna E
Jan	0.212	0.030	0.222	station not estab.	0.519	0.025
Feb	0.129	0.034	0.053	station not estab.	0.196	0.005
Mar	0.005	0.039	0.006	station not estab.	0.232	0.001
Apr	0.003	0.012	0.001	0.148	0.126	0.001
May	0.011	0.019	0.005	0.120	0.223	0.001
June	0.052	0.011	0.009	0.064	0.214	0.001
Jul	0.003	0.011	0.001	0.073	0.167	0.001
Aug	0.004	0.012	0.001	0.053	0.117	0.001
Sept	0.002	0.014	0.002	0.075	0.203	0.002
Oct	0.008	0.006	0.008	0.051	0.158	0.001
Nov	0.035	0.008	station closed	0.046	0.108	0.001
Dec	0.040	0.014	station closed	0.071	0.136	0.004

State and Federal standard: 0.140 ppm

These SPM stations were established to monitor the effects of volcanic emissions on the island of Hawaii. Hilo and Kona are SLAMS stations.
Mt. View 17 shut down on 10/27/10 and Mt. View 23 began operating 12/7/10. The maximum 24-hour SO_2 value for Mt. View 23 in December was 0.031 ppm.

Figure 4-12. 2010 Monthly Maximum 24-Hour Pb Averages

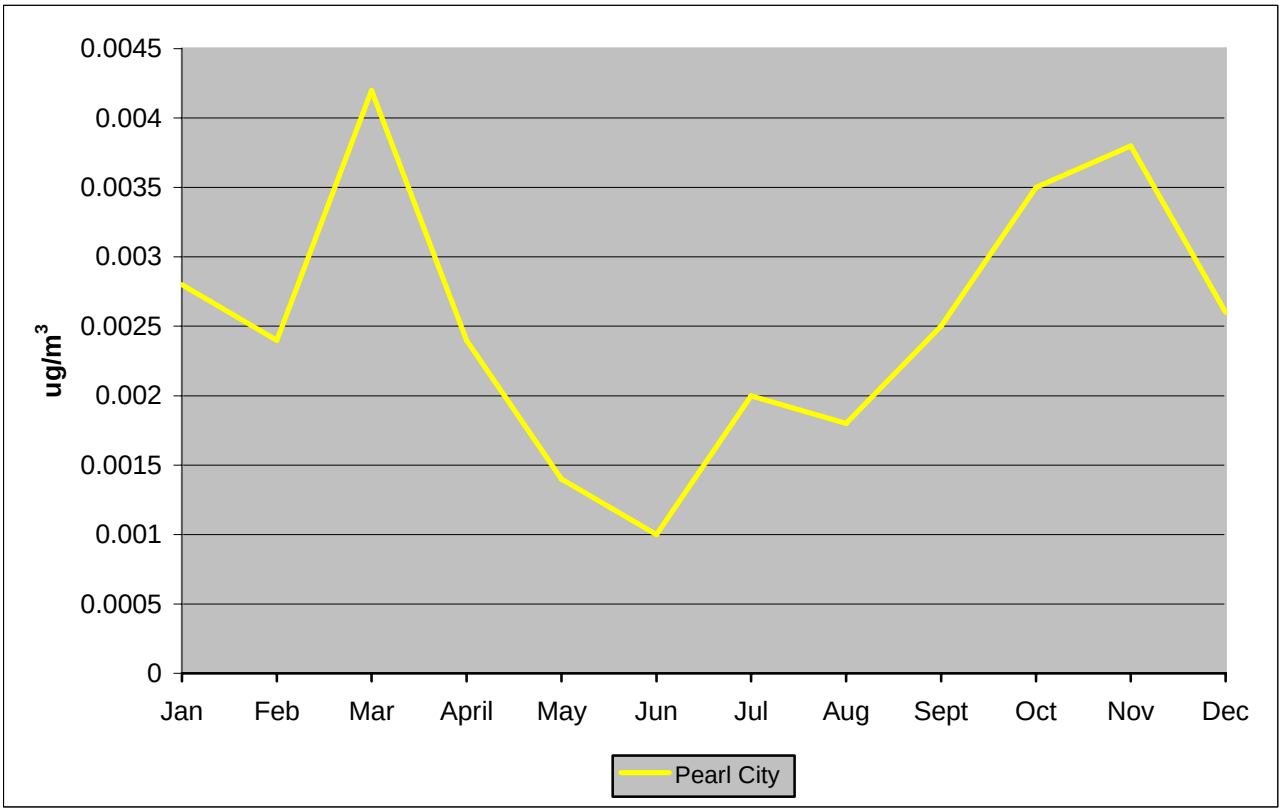


Table 4-27. 2010 Monthly Maximum 24-Hour Pb Values (µg/m^3)

	Pearl City
Jan	0.0028
Feb	0.0024
Mar	0.0042
Apr	0.0024
May	0.0014
June	0.0010
Jul	0.0020
Aug	0.0018
Sept	0.0025
Oct	0.0035
Nov	0.0038
Dec	0.0026

There is no 24-hour federal or state Pb standard. The NAAQS for Pb is a rolling 3-month average not to exceed 0.15 µg/m^3.

Figure 4-13. 2010 Monthly Maximum 1-Hour H_2S Averages

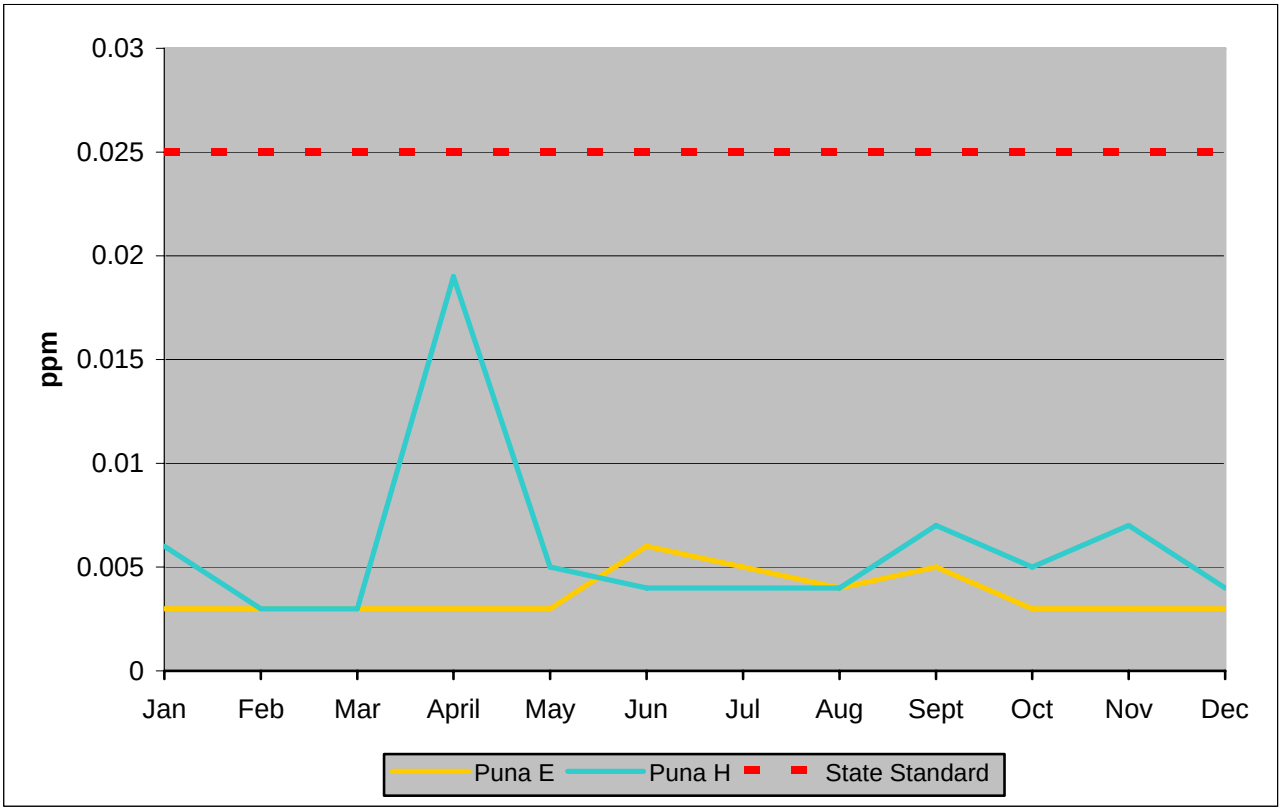


Table 4-28. 2010 Monthly Maximum 1-Hour H_2S Values (ppm)

	Puna E	Puna H
Jan	0.003	0.006
Feb	0.003	0.003
Mar	0.003	0.003
Apr	0.003	0.019
May	0.003	0.005
June	0.006	0.004
Jul	0.005	0.004
Aug	0.004	0.004
Sept	0.005	0.007
Oct	0.003	0.005
Nov	0.003	0.007
Dec	0.003	0.004

State standard: 0.025 ppm

Section 5
2010 $PM_{2.5}$ 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. 2010 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	0.764	0.615	0.3514	57	93
Elemental Carbon	0.45	0.334	0.1	57	93
METALS					
Aluminum	0.094	0.091	0.0216	60	98
Antimony	0.058	0.054	0.209	60	98
Arsenic	0.001	0.001	0.0008	60	98
Barium	0.030	0.030	0.0065	60	98
Bromine	0.004	0.004	0.0012	60	98
Cadmium	0.031	0.021	0.0087	60	98
Calcium	0.142	0.130	0.0496	60	98
Cerium	0.044	0.043	0.0066	60	98
Cesium	0.023	0.023	0.0067	60	98
Chlorine	2.1	1.65	0.5381	60	98
Chromium	0.009	0.002	0.0013	60	98
Cobalt	0.002	0.001	0.0007	60	98
Copper	0.009	0.003	0.0012	60	98
Indium	0.022	0.017	0.103	60	98
Iron	0.095	0.083	0.0268	60	98
Lead	0.003	0.003	0.0017	60	98
Magnesium	0.164	0.140	0.037	60	98
Manganese	0.002	0.002	0.001	60	98
Nickel	0.014	0.013	0.003	60	98
Phosphorus	0.008	0.008	0.0057	60	98
Potassium	0.103	0.077	0.0237	60	98
Rubidium	0.002	0.002	0.0011	60	98
Selenium	0.002	0.001	0.0011	60	98
Silicon	0.27	0.231	0.111	60	98
Silver	0.019	0.019	0.0087	60	98
Sodium	1.19	1.04	0.3416	60	98
Strontium	0.009	0.003	0.0014	60	98
Sulfur	2.1	1.42	0.2736	60	98
Tin	0.018	0.018	0.0122	60	98
Titanium	0.006	0.005	0.0025	60	98
Vanadium	0.004	0.004	0.0017	60	98
Zinc	0.007	0.007	0.0015	60	98
Zirconium	0.012	0.012	0.0041	60	98

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	2.04	0.73	0.112	60	98
Potassium Ion	0.09	0.08	0.019	60	98
Sodium Ion	1.08	0.94	0.428	60	98
Total Nitrate	0.55	0.52	0.45	60	98
Sulfate	6.72	4.73	0.89	60	98

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
2010 AIR TOXICS DATA

The Clean Air Act identified 188 hazardous air pollutants (HAPs) that have been associated with adverse environmental and health effects. Ambient monitoring for air toxics is just one element of the entire air toxics assessment process which may also include regulatory approaches.

A subset of 33 HAPs was selected in EPA's Urban Air Toxics Strategy as having the greatest impact on the public and environment in urban areas. National monitoring efforts have been directed towards these 33 HAPs, and based on consultation with the EPA, a review of available methodology and resource limitations, the state has focused its monitoring efforts on 17 of these 33 HAPs. The following is a brief description of the 17 air toxics being monitored at the Pearl City station. The descriptions are from the EPA website on air toxics which can be found at www.epa.gov/ttnatw01/hlthef/hapindex.html.

There are no ambient air quality standards for air toxics.

Volatile Organic Compounds (VOC)

- Benzene
  Uses: constituent in motor fuels; solvent for fats, waxes, resins, oils, inks, paints, plastics and rubber.
  Sources: emissions from burning of coal and oil, gasoline service stations and motor vehicle exhaust.
- 1,3-Butadiene
  Uses: used in production of rubber and plastics and in copolymers including acrylics.
  Sources: motor vehicle exhaust, manufacturing and processing facilities, forest fires or other combustion, cigarette smoke.
- Carbon tetrachloride
  Uses: used to make refrigerants and propellants for aerosol cans, as a solvent for oils, fats, lacquers, varnishes, waxes, and resins, and as a grain fumigant and dry cleaning agent.
  Sources: accidental releases from production and uses and in indoor air from building materials or products and in cleaning agents used in the home.
- Chloroform
  Uses: mainly to make the refrigerant HCFC-22.
  Sources: release associated with its manufacture and use, as well as its formation in the chlorination of drinking water, wastewater, and swimming pools. Also may be emitted by pulp and paper mills, hazardous waste sites and landfills.
- 1,2-Dichloropropane
  Uses: as a chemical intermediate in the production of chlorinated organic chemicals; as an industrial solvent; in photographic film manufacture; for paper coating and petroleum catalyst regeneration.
  Sources: mainly occupational exposures or from evaporation from wastewater that contains the chemical.

- Dichloromethane
  Uses: paint strippers and removers; as a metal cleaning and finishing solvent in electronics manufacturing; as an agent in urethane foam blowing; and as a propellant in aerosols for paints, automotive products and insect sprays.
  Sources: occupational and consumer exposure from spray painting or other aerosol uses.
- Tetrachloroethylene (perchloroethylene or PERC)
  Uses: dry cleaning and metal degreasing operations.
  Sources: mainly occupational exposure.
- Trichloroethylene
  Uses: industrial degreasing of metal parts.
  Sources: in the vapor of degreasing operations; in consumer products such as correction fluids, paint removers and strippers, adhesives, spot removers and rug-cleaning fluids.
- Vinyl chloride
  Uses: used to make polyvinyl chloride (PVC).
  Sources: outgas from new plastic parts such as in new cars.

Aldehydes

- Acetaldehyde
  Uses: used in the production of perfumes, polyester resins and dyes. Also used as a fruit and fish preservative, as a flavoring agent, a denaturant for alcohol, in fuel and as a solvent in rubber, tanning and paper industries.
  Sources: ubiquitous in the environment; formed as a product of incomplete wood combustion in fireplaces and woodstoves, coffee roasting, burning tobacco and vehicle exhaust fumes.
- Formaldehyde
  Uses: mainly in manufacturing resins and particleboard products. Also used as an analytical reagent, and in concrete and plaster additives, cosmetics, disinfectants, fumigants, photography and wood preservation.
  Sources: in indoor air as it is released from various consumer products such as building materials and home furnishings. Found in ambient air from power plants, manufacturing facilities, incinerators, auto exhaust emissions, and from smoking.

Metals

- Beryllium
  Uses: used in electrical components, tools, structural components for aircraft, missiles, and satellites and used in products such as televisions, calculators and personal computers.
  Sources: airborne exposure can be from the burning of coal and oil, and from tobacco smoke.
- Cadmium
  Uses: a byproduct from smelting of zinc, lead, or copper ores, it is also used to manufacture pigments and batteries and in the metal-plating and plastics industries.
  Sources: a major source in the ambient air is from the burning of fossil fuels and from municipal waste incinerators. Smoking is also another source of cadmium.

- Chromium
  Uses: metal chromium is used in making steel and alloys. Chromium compounds are used for chrome plating, in the manufacture of dyes and pigments, in leather and wood preservation, and small amounts may be used in copying machine toner.

Sources: occurs naturally in rocks, plants, soils and in volcanic dust and gases. Industrial sources include cement-producing plants, automobile brake lining and catalytic converters, and leather tanneries.

- Lead
  Uses: primary use is in the manufacture of batteries. Also in the production of sheet lead, in solder and pipes, and in ceramic glazes, paint, ammunition and cable covering.
  Sources: the largest source prior to 1996 was from leaded gasoline, however since EPA banned its use in gasoline, airborne lead levels have decreased dramatically. Other airborne sources include combustion of solid waste, coal and oil and from tobacco smoke.
- Manganese
  Uses: primarily in the production of steel, dry-cell batteries, matches, and fireworks. Manganese sulfate is used as fertilizer and is found in glazes and varnishes. Potassium permanganate is used for water purification and in waste-treatment plants.
  Sources: naturally occurring, it is found in rock and soil. It can also be released into the air by power plants and coke ovens.
- Nickel
  Uses: used for nickel alloys, electroplating, batteries, coins, industrial plumbing, spark plugs, machinery parts, stainless-steel, and in nickel-chrome wires and catalysts.
  Sources: a natural element, it is found in small amounts in food, water, soil and air. Exposure in the ambient air is from oil and coal combustion, nickel metal refining, sewage sludge incineration, manufacturing facilities and through activities such as smoking and use of stainless steel cooking and eating utensils.

Table 6-1. 2010 Summary of Air Toxics Data

Sampling is conducted for 24 hours once every 6 days

Parameter	1st High ppbC	2nd High ppbC	Annual Arithmetic Mean	No. of Samples	Percent Recovery
VOCs					
Benzene	4.98	4.14	1.301	58	95
1,3-Butadiene	0.05	0.05	0.05	58	95
Carbon tetrachloride	0.05	0.05	0.05	58	95
Chloroform	0.1	0.1	0.05	58	95
1,2-Dichloropropane	0.15	0.15	0.15	58	95
Dichloromethane	0.27	0.05	0.054	58	95
Tetrachloroethylene	0.1	0.1	0.1	58	95
Trichloroethylene	0.01	0.01	0.01	58	95
Vinyl chloride	0.1	0.1	0.1	58	95
ALDEHYDES					
Acetaldehyde	3.04	2.88	1.861	61	100
Formaldehyde	2.18	1.82	1.291	61	100
	1st High µg/m³	**2nd High µg/m³**	**Annual Arithmetic Mean**	**No. of Samples**	**Percent Recovery**
METALS					
Beryllium	0.0001	0.0001	0.0001	60	98
Cadmium	0.0003	0.0001	0.0001	60	98
Chromium	0.011	0.009	0.0032	60	98
Lead	0.0041	0.0028	0.00154*	46	-
Manganese	0.015	0.012	0.0059	60	98
Nickel	0.015	0.01	0.003	60	98

* Does not meet summary criteria, incomplete year

Table 6-2. Air Toxics Collection and Analysis Methods

Parameter	Collection Method	Analysis Method
VOCs	Stainless Steel Canister-Subambient Pressure	Gas Chromatograph
ALDEHYDES	Cartridge-DNPH-Silica Sep Pak	High Performance Liquid Chromatography (HPLC)-Photodiode Array
METALS	Hi-Volume Total Suspended Particulate sampler	Atomic Absorption

Section 7
AMBIENT AIR QUALITY TRENDS: SLAMS

The following graphs illustrate 5-year trends for PM_{10}, $PM_{2.5}$, SO_2, NO_2, O_3, and CO from 2006 to 2010 at all SLAMS stations monitoring for those pollutants.

Figures 7-1 and 7-2 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 7-3 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 7-4.

Figures 7-5 and 7-6 are graphs of the SO_2 annual and maximum 24-hour averages.

Figure 7-7 and 7-8 show the annual and 1-hour averages, respectively, 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 7-9 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 7-10 and 7-11, 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 7-1. PM_{10} Annual Average: 2006 – 2010

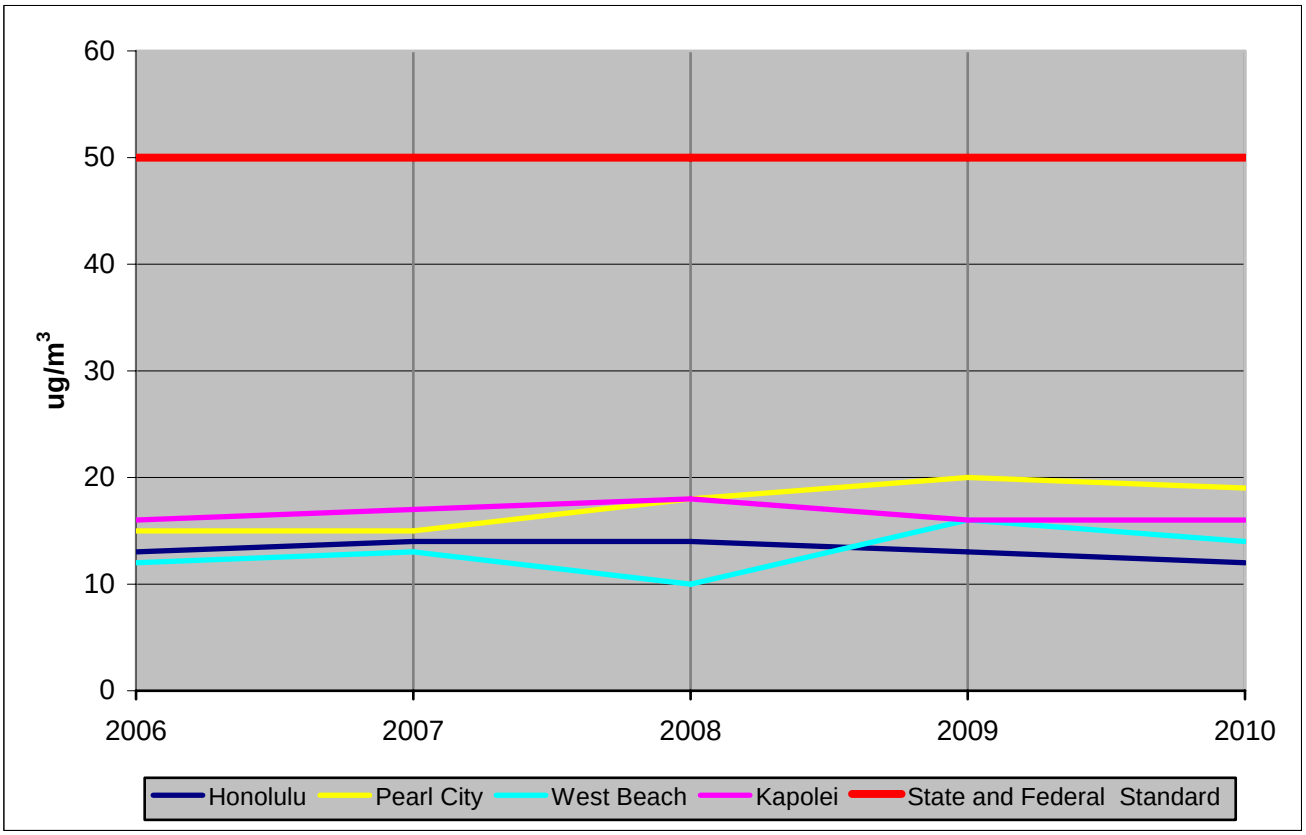


Figure 7-2. PM_{10} Maximum 24-Hour Average: 2006 – 2010

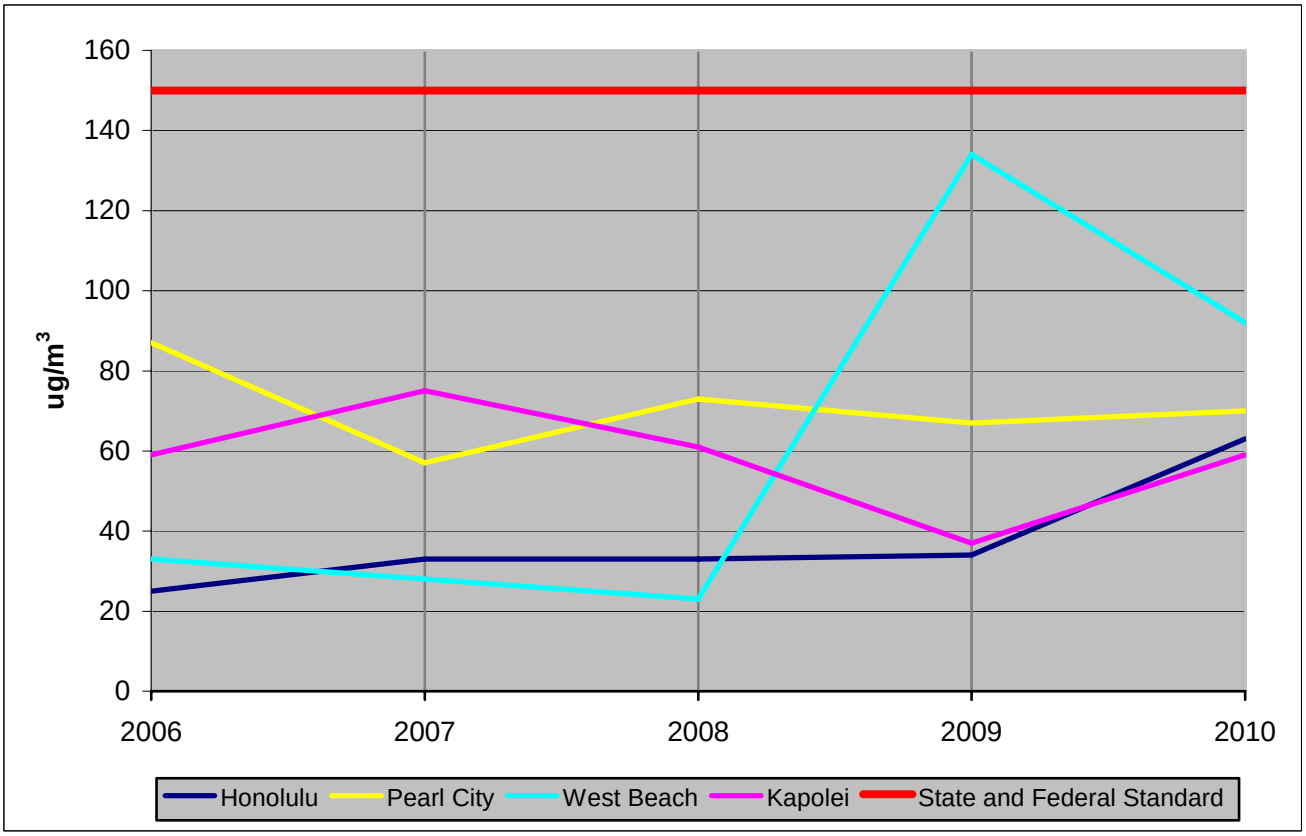


Figure 7-3. $PM_{2.5}$ Annual Average: 2006 – 2010

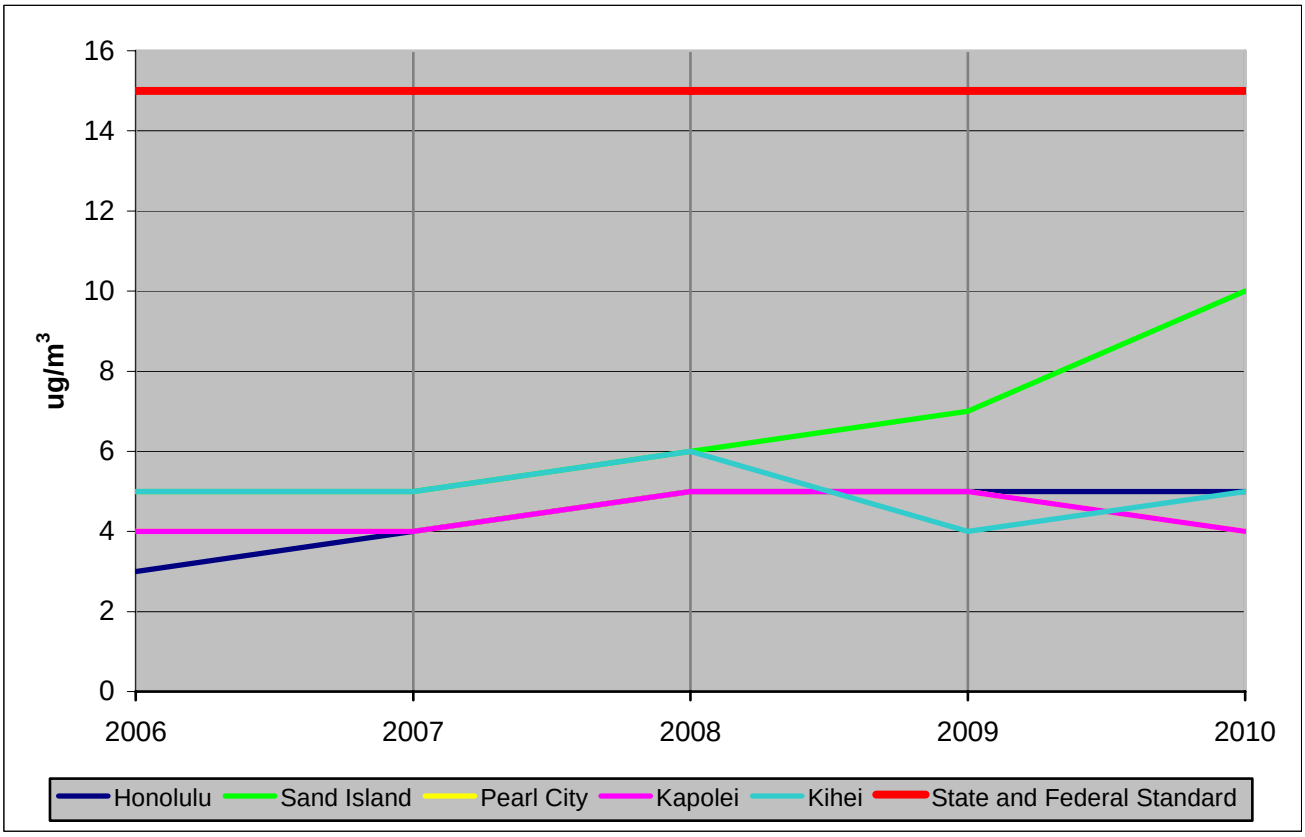


Figure 7-4. $PM_{2.5}$ 98th Percentile 24-Hour Average: 2006 – 2010

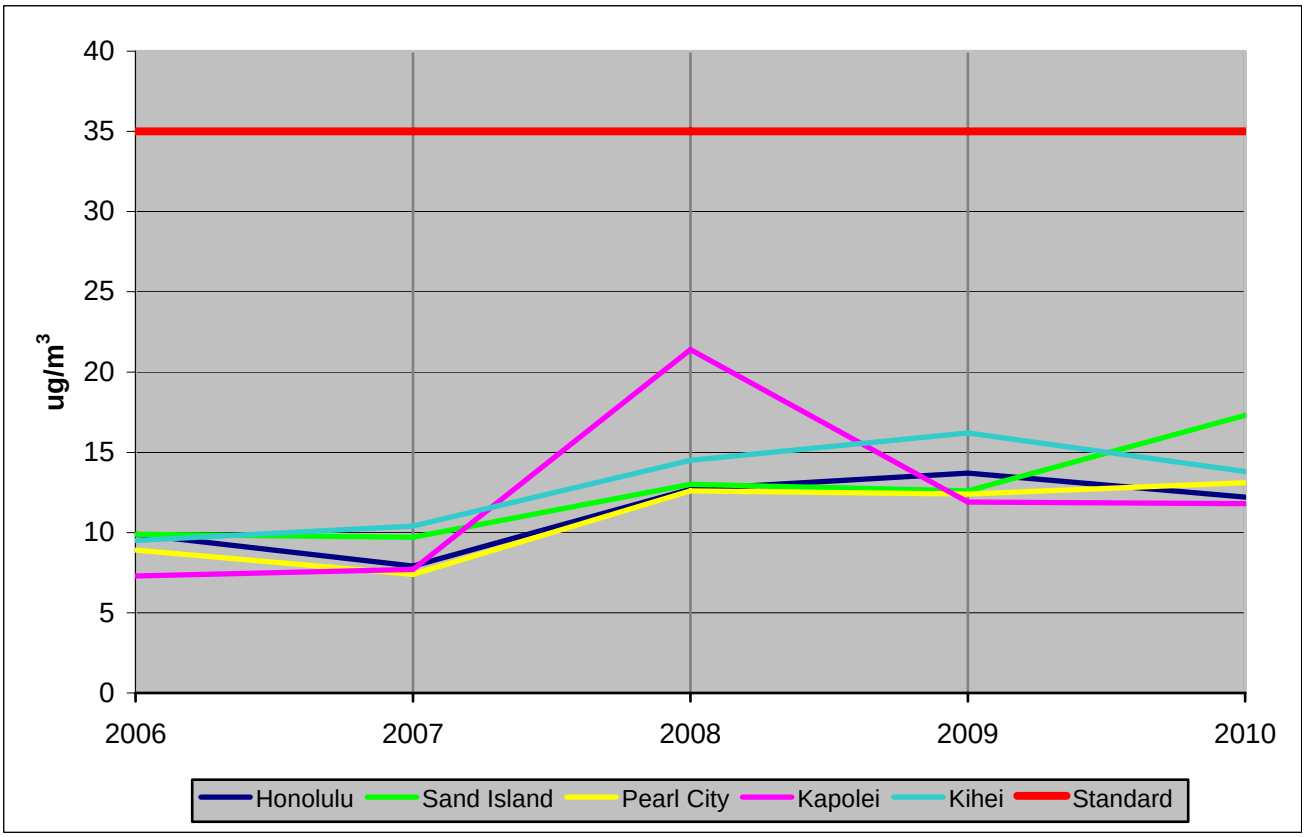


Figure 7-5. SO_2 Annual Average: 2006 – 2010

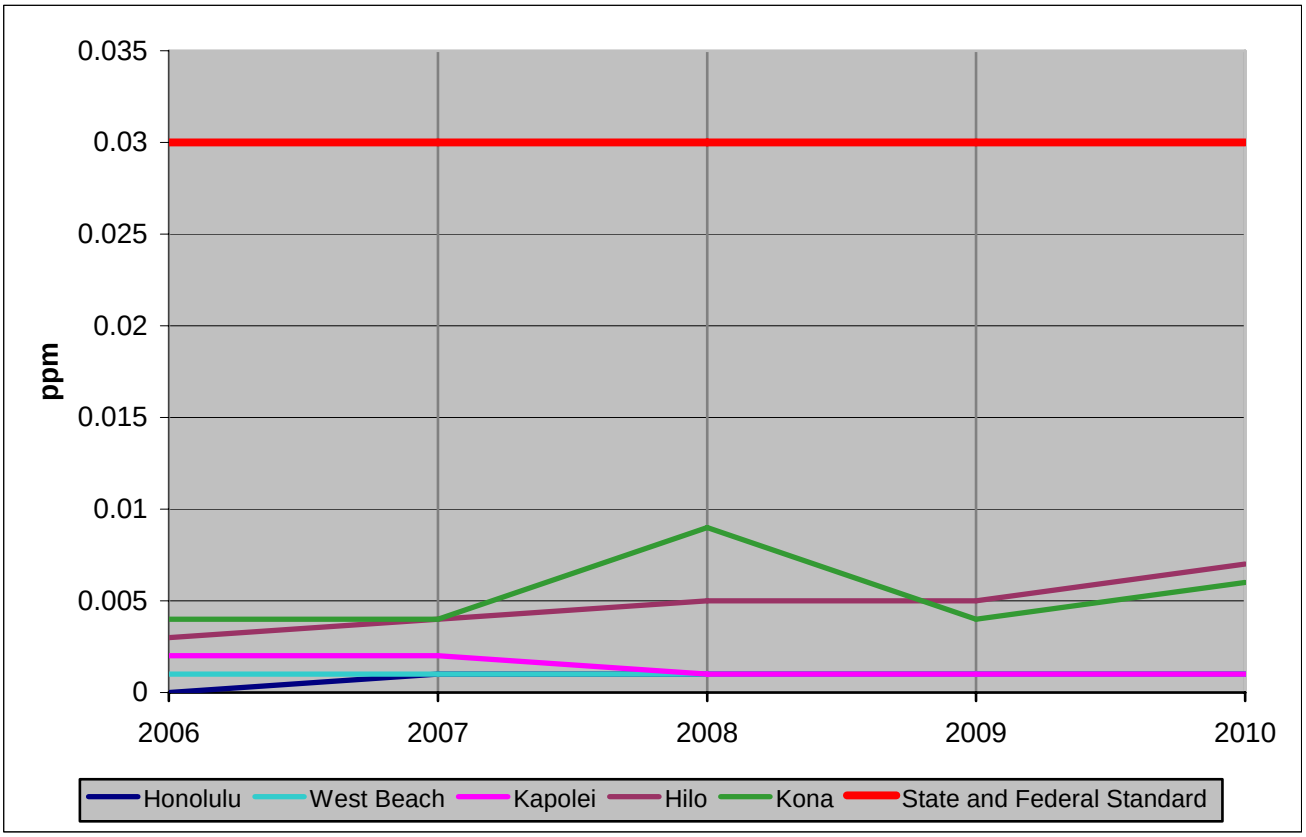


Figure 7-6. SO_2 Maximum 24-Hour Average: 2006 – 2010

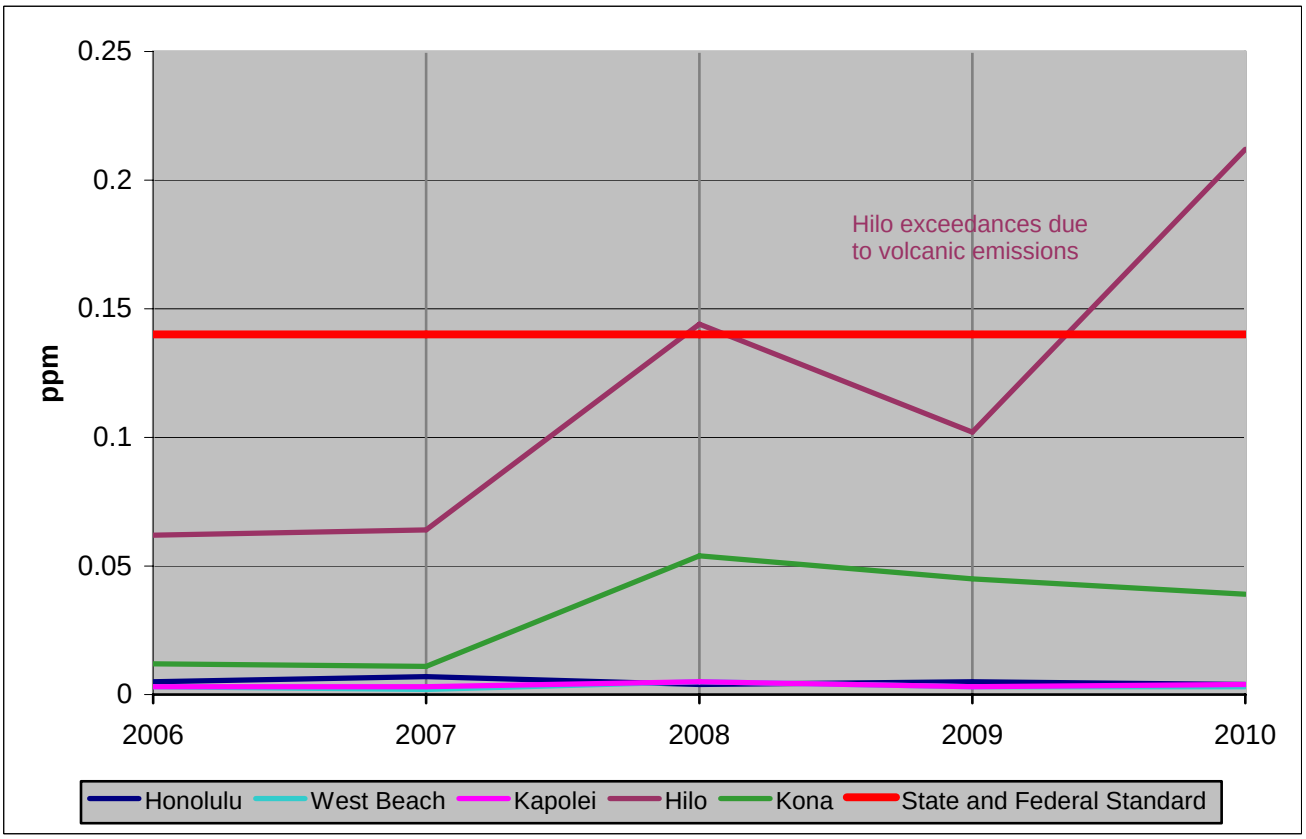


Figure 7-7. NO_2 Annual Average 2006 – 2010

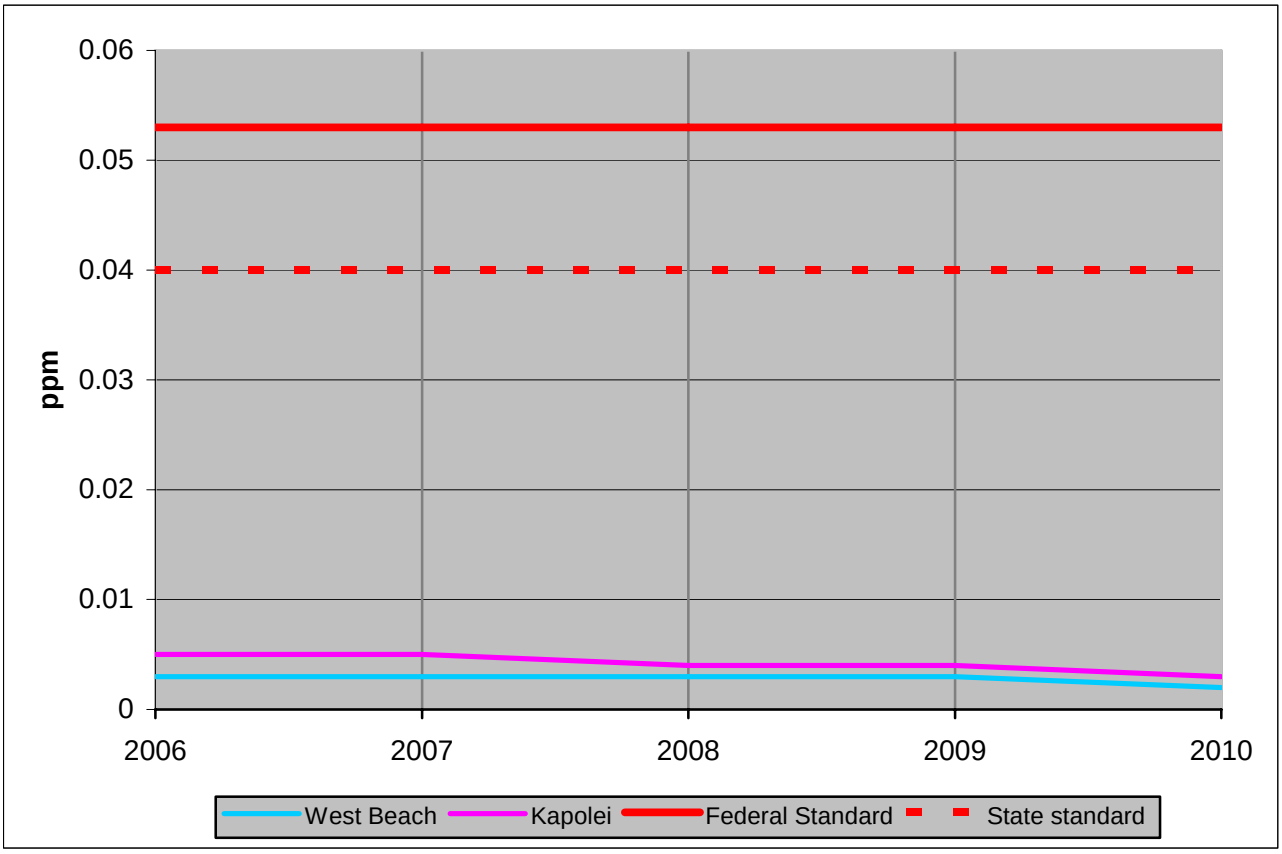


Figure 7-8. NO_2 Maximum 1-Hour Average: 2006 – 2010

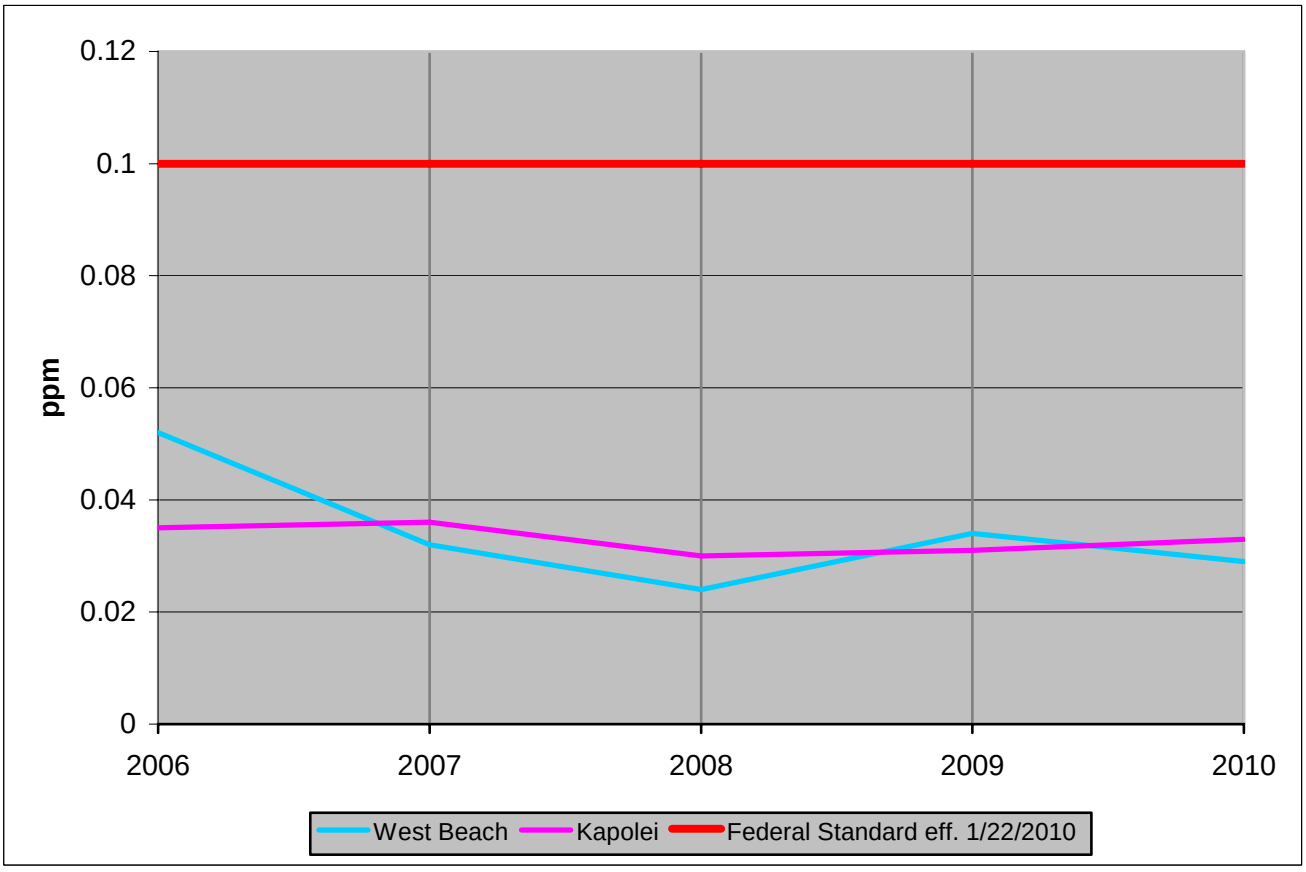


Figure 7-9. O_3 Fourth Highest Daily Maximum 8-Hour Average: 2006 – 2010

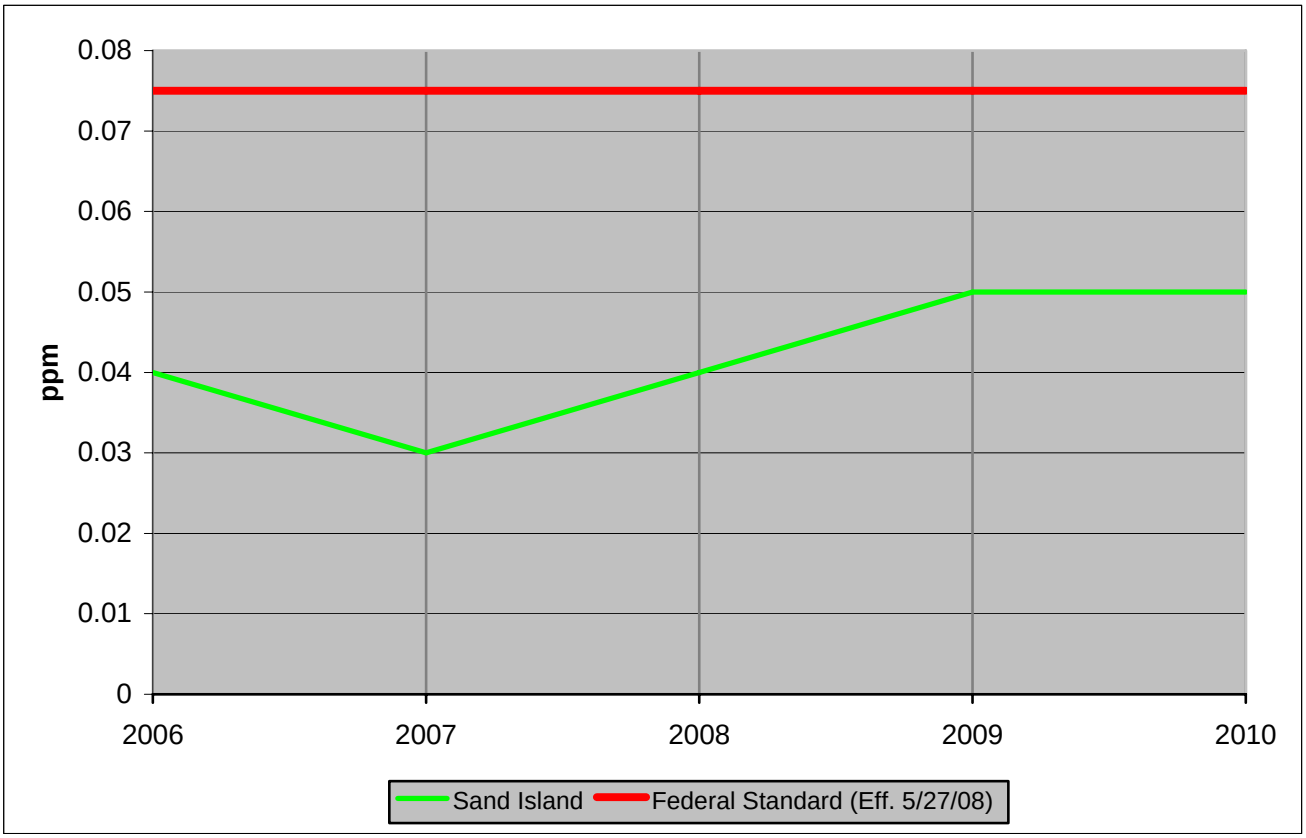


Figure 7-10. CO Maximum 1-Hour Average: 2006 – 2010

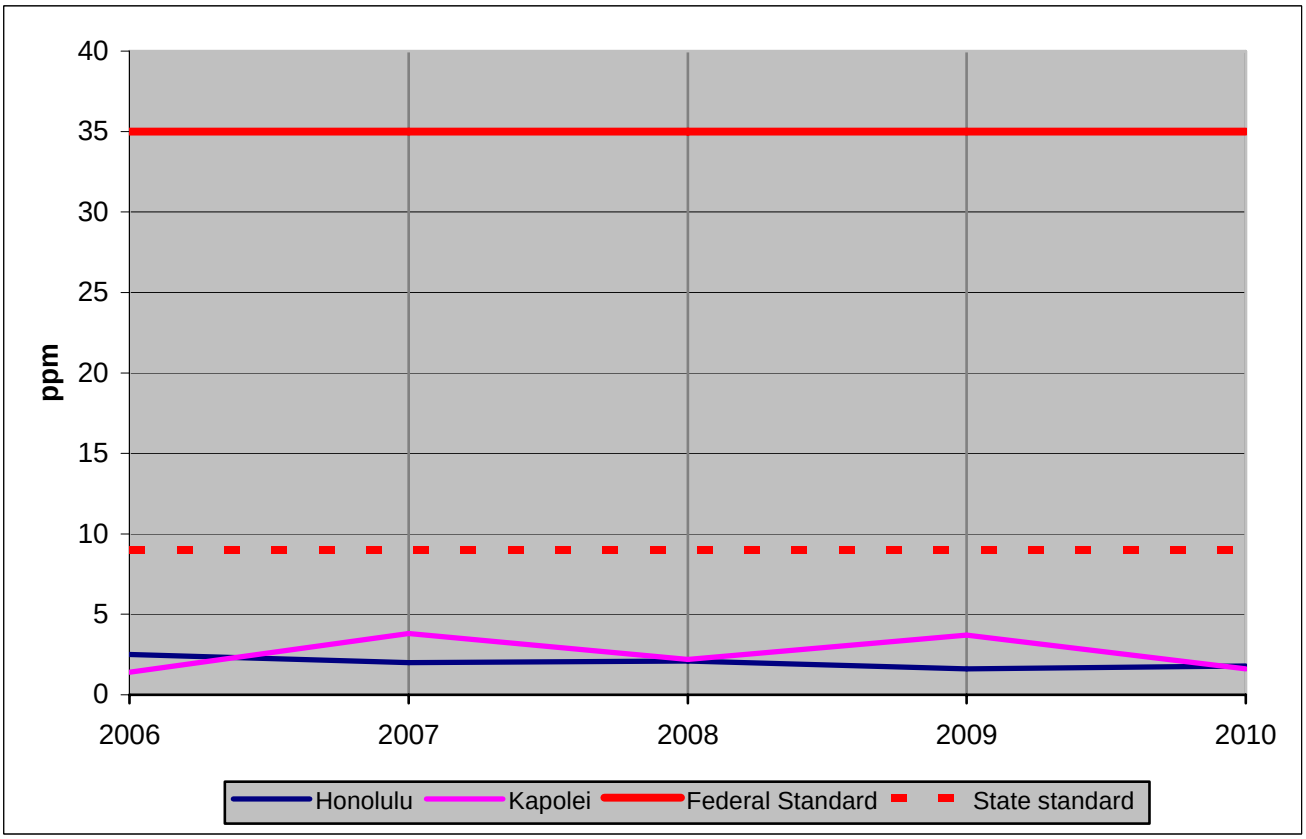


Figure 7-11. CO Maximum 8-Hour Average: 2006 – 2010