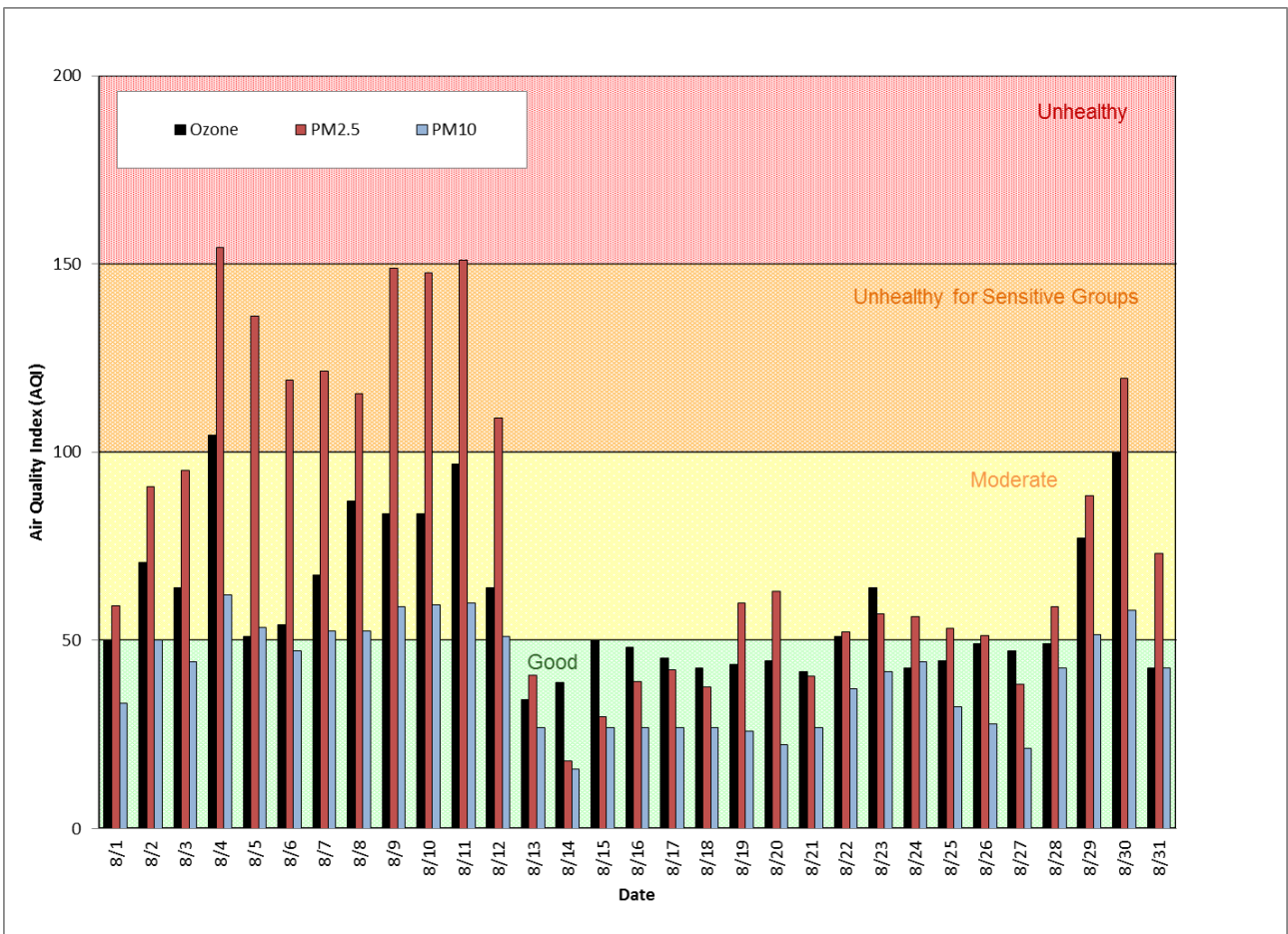


Spokane Regional Clean Air Agency Air Quality Report - August 2017

Wildfire smoke converged on the region for much of August, making for some of the worst air quality on record for Spokane. A strong high pressure ridge remained centered just off the Washington coast for the first 12 days of the month, bringing generally northerly airflow over the region, which carried smoke from wildfires in British Columbia and northern Washington into much of the region, including the Spokane area. A thermal low over the Columbia Basin served to also bring smoke from Montana wildfires into eastern Washington, further degrading air quality. The high pressure ridge and accompanying stagnant conditions persisted for so many days because of a Rex Block pattern of atmospheric pressure over the region. The ridge finally moved east of the region as a low pressure system from the Gulf of Alaska moved into the region on the 13th. Near the end of the month, southwesterly winds carried smoke to the area from wildfires in the Oregon and Washington Cascades. Fine particulate matter (PM_{2.5}) exceeded federal air quality standards on 10 days, including 7 days at the Spokane-Augusta Ave air monitoring station. The Spokane-Augusta Ave station is the only station used to determine Spokane County's compliance with the NAAQS for PM_{2.5}. There was one exceedance of the ground-level ozone standard when the 8-hour average ozone concentration reached 0.72 ppm at Spokane-Greenbluff on August 4th.

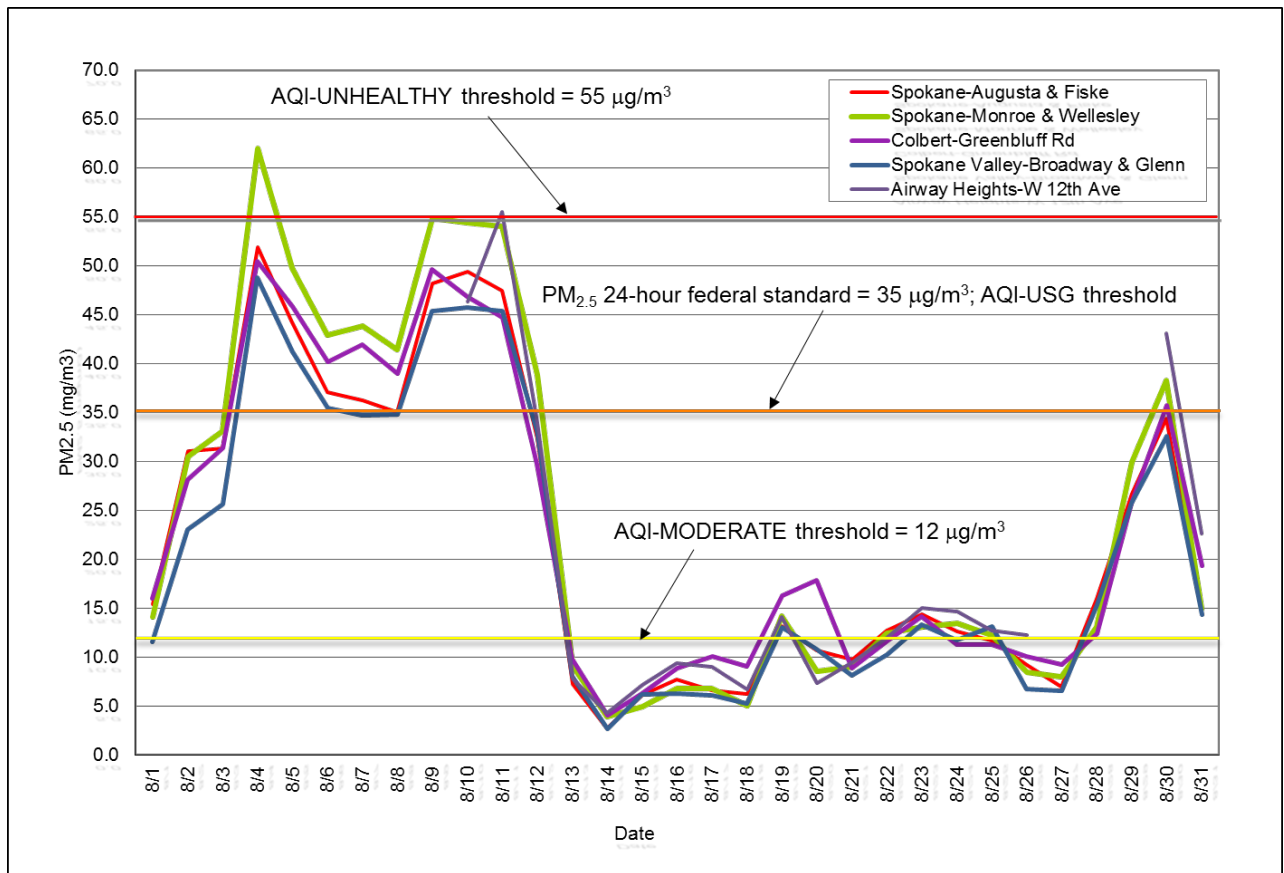
The Air Quality Index (AQI) was in the UNHEALTHY range for fine particulate matter on two days in August and in the UNHEALTHY FOR SENSITIVE GROUPS (USG) category on ten days (Figure 1). Both PM_{2.5} and ozone were in the USG category on the 4th. The maximum AQI value for the month was 154, based on PM_{2.5} levels on the 4th (24-hour mass concentration = 62 µg/m³). Smoke pushed particulate matter (PM₁₀) into the AQI-MODERATE category on ten days. Ozone was in the AQI-MODERATE category on 14 days.

Figure 1: Air Quality Index (AQI) values for August 2017. The data represent the maximum AQI values across all monitoring stations within Spokane County.



See Appendix 1 of this report for information about federal air quality standards or Appendix 2 for a description of the AQI. Daily mass concentrations of PM_{2.5} monitored in August throughout the network are shown in Figure 2.

Figure 2: Multi-station 24-hour average PM_{2.5} for August 2017; Spokane County.



Daily air quality data for August at all monitoring stations in the Spokane region are provided in Appendix 3. Current and historical air quality data can be obtained electronically from Ecology’s air monitoring data website, <https://fortress.wa.gov/ecy/enviwa/Default.htm>.

Tables 1 and 2 contain the maximum AQI values for each pollutant for the month and for the year to date. Table 3 summarizes the year to date daily AQIs by category and compares them to last year's AQIs.

Table 1: Maximum AQI values and pollutant concentrations for this reporting period

Pollutant	AQI/Concentration	Location	Date
O ₃	105/0.072 ppm (8 hour)	Spokane, Greenbluff	8/4
PM ₁₀	62/78 µg/m ³	Spokane, E. Augusta Ave (Augusta & Fiske)	8/4
PM _{2.5}	154/62.0 µg/m ³	Spokane, N. Monroe St (Monroe & Wellesley)	8/4

Table 2: Maximum AQI values and pollutant concentrations for calendar year 2017

Pollutant	AQI/Concentration	Location	Date
O ₃	105/0.072 ppm (8 hour)	Spokane, Greenbluff	8/4
PM ₁₀	62/78 µg/m ³	Spokane, E. Augusta Ave (Augusta & Fiske)	8/4
PM _{2.5}	154/62.0 µg/m ³	Spokane, N. Monroe St (Monroe & Wellesley)	8/4

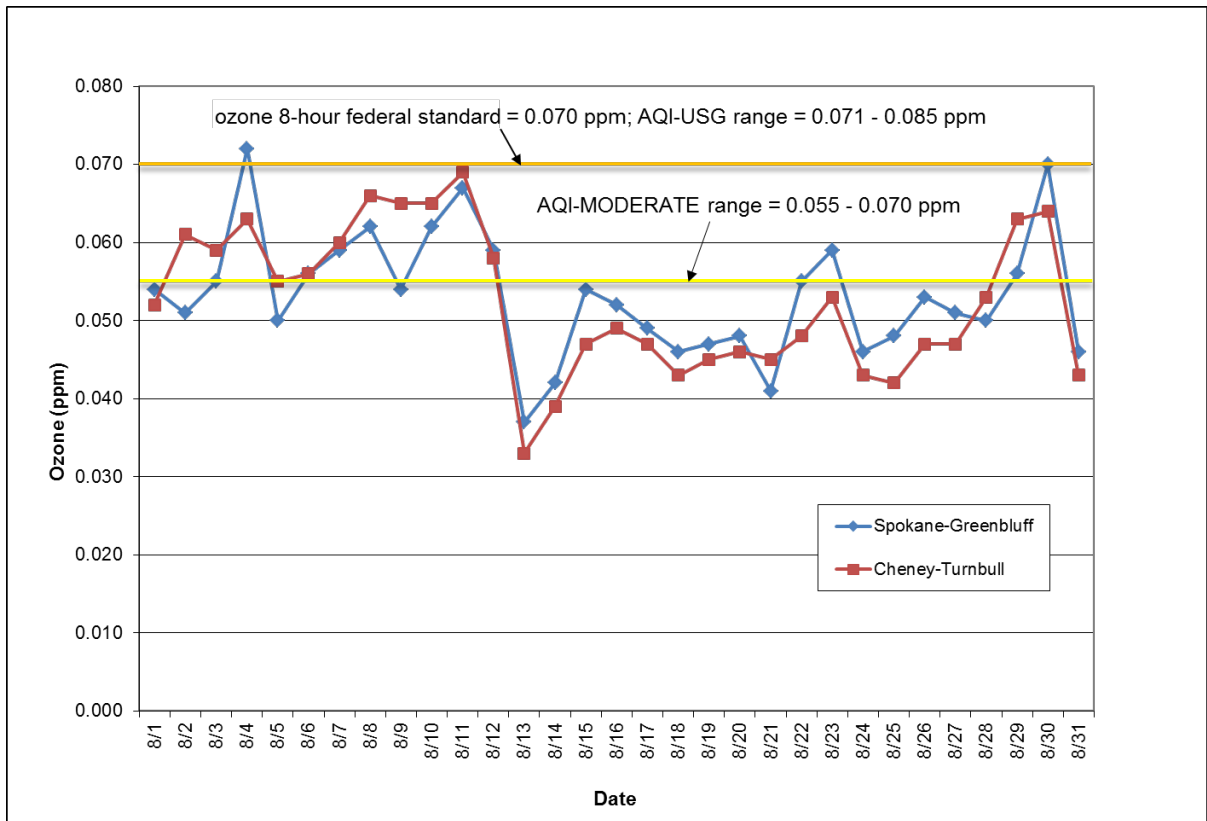
Table 3: AQI summary as of August 31, 2017.

Category	Number of Days This Year
Good (0-50)	162
Moderate (51-100)	69
Unhealthy for Sensitive Groups (101-150)	10
Unhealthy (151-200)	2
Very Unhealthy (201-300)	0
Hazardous (>300)	0

Ground-level ozone is formed when nitrogen oxides and volatile organic compounds chemically react in the presence of sunlight. It is measured in units of parts per million (ppm) in ambient air. Ozone is a strong oxidizer and can damage lung tissue, thereby impairing respiratory function. The main sources of ozone precursors are motor vehicle emissions and refueling, gasoline storage and transport, paints, solvents and industry.

The maximum 8-hour running average ozone concentration for the month was 0.072 ppm measured at Greenbluff on the 4th (Figure 3). Eight hour average ozone concentrations in the range 0.055 to 0.070 ppm are in the “Moderate” air quality category the AQI and 0.071 to 0.085 ppm are in the “Unhealthy for Sensitive Groups” category. When concentrations are below 0.055 ppm, air quality is “good” with respect to ground-level ozone.

Figure 3: Eight hour maximum ozone concentrations for the Spokane region in August. An ozone measurement above 0.070 ppm, averaged over eight hours, exceeds the federal ozone standard. However, it is not a violation of the standard to exceed this level on a given day because determination of attainment status is based on averaging data over a period of years. See Appendix 1 for more detailed information about attainment of federal air quality standards.



Appendix 1 – National Ambient Air Quality Standards

The Clean Air Act requires EPA to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants, carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), particulate matter (PM₁₀ and PM_{2.5}), ground-level ozone (O₃) and sulfur dioxide (SO₂; Table A-1). These are known as “criteria” pollutants because the US EPA established regulatory limits to concentrations in ambient air using human health or environmentally based criteria. Carbon monoxide, particulate matter and ozone are monitored in Spokane County by the Spokane Regional Clean Air Agency (SRCAA) and the Washington State Department of Ecology (Ecology).

Table A-1: National Ambient Air Quality Standards

Pollutant [links to historical tables of NAAQS reviews]	Primary/ Secondary	Averaging Time	Level	Form	
Carbon Monoxide (CO)	primary	8 hours	9 ppm	Not to be exceeded more than once per year	
		1 hour	35 ppm		
Lead (Pb)	primary and secondary	Rolling 3 month period	0.15 µg/m ³ ⁽¹⁾	Not to be exceeded	
Nitrogen Dioxide (NO₂)	primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years	
	primary and secondary	1 year	53 ppb ⁽²⁾	Annual Mean	
Ozone (O₃)	primary and secondary	8 hours	0.070 ppm ⁽³⁾	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years	
Particle Pollution (PM)	PM _{2.5}	primary	1 year	12.0 µg/m ³	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m ³	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m ³	98th percentile, averaged over 3 years
	PM ₁₀	primary and secondary	24 hours	150 µg/m ³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO₂)	primary	1 hour	75 ppb ⁽⁴⁾	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years	
	secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year	

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m³ as a calendar quarter average) also remain in effect.

(2) The level of the annual NO₂ standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O₃ standards additionally remain in effect in some areas. Revocation of the previous (2008) O₃ standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) The previous SO₂ standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous SO₂ standards or is not meeting the requirements of a SIP call under the previous SO₂ standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the require NAAQS.

Appendix 2 – Air Quality Index

The Air Quality Index (AQI) is EPA’s color-coded tool for communicating daily air quality to the public and can be calculated for any of the criteria pollutants except lead, provided monitoring data are available. An index value above 100 indicates that the concentration of a criteria pollutant exceeded the limit established in the NAAQS. Categories of the AQI are “good” (green, 0-50), “moderate” (yellow, 51-100), “unhealthy for sensitive groups” (orange, 101-150), “unhealthy” (red, 151-200), “very unhealthy” (purple, 201-300) and “hazardous” (maroon, 301-500; Table A-2).

Table A-2: Air pollutant breakpoints for the Air Quality Index.

Air Quality Index Levels of Health Concern	Color Code	Index Numerical Value	Breakpoints				Health Effects
			O ₃ (ppm) 8-hour	PM _{2.5} (µg/m ³) 24-hour	PM ₁₀ (µg/m ³) 24-hour	CO (ppm) 8-hour	
Good	Green	0-50	0.000-0.054	0.0-12.0	0-54	0.0-4.4	Air quality is considered satisfactory and air pollution poses little or no risk.
Moderate	Yellow	51-100	0.055-0.070	12.1-35.4	55-154	4.5-9.4	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	Orange	101-150	0.071-0.085	35.5-55.4	155-254	9.5-12.4	People especially sensitive to air pollution may experience health effects. The general public is not likely to be affected. An AQI in this category or above indicates that air pollution exceeds levels acceptable under federal air quality standards.
Unhealthy	Red	151-200	0.086-0.105	55.5-150.4	255-354	12.5-15.4	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	Purple	201-300	0.106-0.200	150.5-250.4	355-424	15.5-30.4	Health alert: everyone may experience more serious health effects.
Hazardous	Maroon	>300	0.201 to the Significant Harm Level* (0.600 ppm, 2 hour average)	250.5+	425+	30.5+	Health warnings of emergency conditions. The entire population is more likely to be affected.

*The significant harm level (SHL) is set at a level that represents imminent and substantial endangerment to public health.

Appendix 3

Table A-3: Summary air quality data for August for air monitoring stations in Spokane County. The ground-level ozone data are maximum 8-hour running averages in parts per million (ppm) and the PM data are 24-hour averages in micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$). There are no data for Airway Heights for the 1st through the 9th because of vandalism and theft of equipment from the monitoring station or for the 27th through the 29th because of a power outage. Turnbull PM₁₀ is not reported elsewhere in this document because readings were affected by road dust as fire crews traveled on gravel roads close to the monitor.

Date	Ozone Greenbluff (8 hour max, ppm)	Ozone Turnbull NWR (8 hour max, ppm)	PM _{2.5} Augusta & Fiske BAM (24 hour avg, $\mu\text{g}/\text{m}^3$)	PM _{2.5} Broadway & University BAM (24 hour avg, $\mu\text{g}/\text{m}^3$)	PM _{2.5} Colbert TEOM (24 hour avg, $\mu\text{g}/\text{m}^3$)	PM _{2.5} Airway Heights TEOM (24 hour avg, $\mu\text{g}/\text{m}^3$)	PM _{2.5} Monroe & Wellesley nephelometer (24 hour avg, $\mu\text{g}/\text{m}^3$)	PM ₁₀ Augusta & Fiske TEOM (24 hour avg, $\mu\text{g}/\text{m}^3$)	PM ₁₀ Turnbull NWR BAM (24 hour avg, $\mu\text{g}/\text{m}^3$)
8/1	0.054	0.052	15.4	11.5	16.0		14.1	36	36
8/2	0.051	0.061	31.0	23.0	28.1		30.5	54	56
8/3	0.055	0.059	31.3	25.6	31.4		33.1	48	48
8/4	0.072	0.063	51.9	48.8	50.5		62.0	78	86
8/5	0.050	0.055	44.2	41.2	45.8		49.8	61	63
8/6	0.056	0.056	37.1	35.4	40.2		42.9	51	56
8/7	0.059	0.060	36.2	34.7	41.9		43.8	59	150
8/8	0.062	0.066	35.0	34.8	39.0		41.4	59	72
8/9	0.054	0.065	48.2	45.4	49.6		54.9	72	81
8/10	0.062	0.065	49.4	45.7	46.8	46.3	54.4	73	83
8/11	0.067	0.069	47.4	45.4	44.7	55.5	54.0	74	73
8/12	0.059	0.058	32.3	33.1	29.7	33.9	38.8	56	62
8/13	0.037	0.033	7.2	8.0	9.8	7.8	9.1	29	31
8/14	0.042	0.039	2.7	2.6	4.0	4.3	3.9	17	18
8/15	0.054	0.047	6.1	6.2	6.3	7.1	4.9	29	41
8/16	0.052	0.049	7.7	6.3	8.9	9.4	6.8	29	24
8/17	0.049	0.047	6.6	6.1	10.1	9.0	6.8	29	24
8/18	0.046	0.043	6.2	5.2	9.0	6.7	5.0	29	32
8/19	0.047	0.045	13.2	13.0	16.3	14.1	14.2	28	19
8/20	0.048	0.046	10.7	10.8	17.8	7.3	8.5	24	16
8/21	0.041	0.045	9.7	8.1	8.9	9.5	9.0	29	31
8/22	0.055	0.048	12.7	10.2	11.6	12.0	12.4	40	36
8/23	0.059	0.053	14.4	13.3	14.1	15.0	13.1	45	39
8/24	0.046	0.043	12.6	11.7	11.3	14.6	13.4	48	43
8/25	0.048	0.042	11.7	13.1	11.3	12.7	12.2	35	26
8/26	0.053	0.047	9.2	6.7	10.1	12.2	8.4	30	26
8/27	0.051	0.047	7.0	6.5	9.2		8.0	23	23
8/28	0.050	0.053	15.9	15.3	12.4		13.1	46	56
8/29	0.056	0.063	26.7	25.7	25.7		29.9	57	63
8/30	0.070	0.064	34.4	32.6	35.7	43.1	38.3	70	63
8/31	0.046	0.043	14.7	14.3	19.3	22.6	14.9	46	42
AVG	0.053	0.052	22.2	20.7	23.1	18.1	24.2	45	49
MAX	0.072	0.069	51.9	48.8	50.5	55.5	62.0	78	150