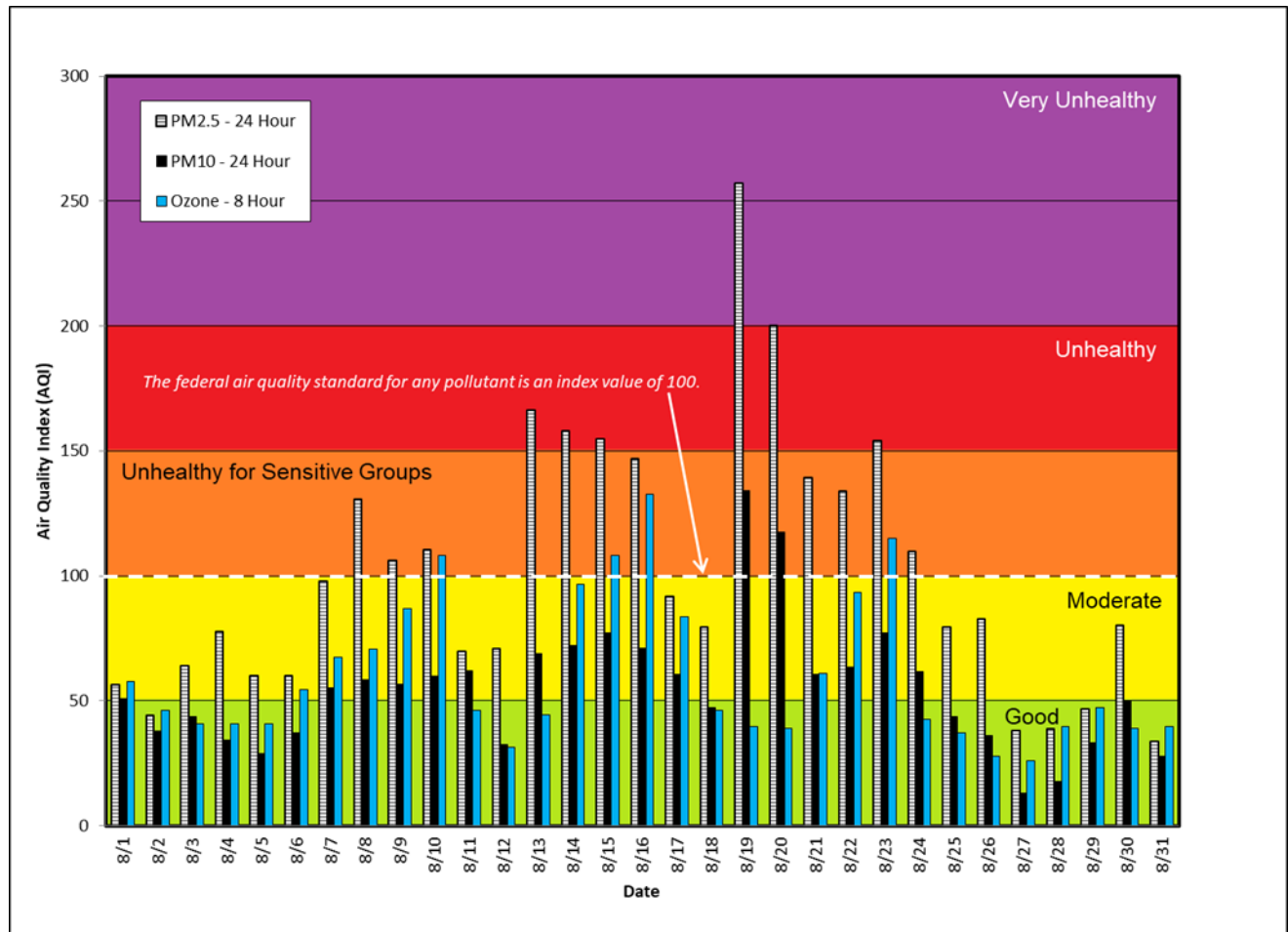


Spokane Regional Clean Air Agency Air Quality Report - August 2018

Some of the worst air quality on record for the Spokane area occurred in August as numerous wildfires in British Columbia, Washington, Oregon, Idaho, Montana, and California caused widespread and heavy smoke across the Pacific Northwest and western Canada. Spring 2018 was cool and wet, which allowed abundant growth of grasses and shrubs, in turn providing an abundance of tinder in the hot and dry summer.

Significant degradation of local air quality from smoke began in July as the wildfire season got underway, but pollution levels became much worse in August, especially for three weeks from the 7th through the 24th (Figure 1). Fine particles (PM_{2.5}) reached the AQI-Unhealthy for Sensitive Groups (USG) and Unhealthy levels and ground-level ozone reached the USG level on several days.

Figure 1: Air Quality Index (AQI) values for August 2018. The data represent the maximum AQI values across all monitoring stations within Spokane County.



Federal air quality standards correspond to an AQI value of 100, i.e., an AQI value of 101 or above exceeds air quality standards. That is the level of the threshold between the Moderate and Unhealthy for Sensitive Groups categories. PM_{2.5} exceeded federal air quality standards on the 8th through 10th, 13th through 16th, and 19th through 24th (13 days). Exceedances were recorded at the Spokane area’s PM_{2.5} regulatory monitoring station (Spokane-Augusta & Fiske) on all but one of those days, meaning the data are submitted to EPA for determining the area’s compliance with federal air quality standards. Particulate matter (PM₁₀) exceeded the federal standard on the 19th and 20th, also because of smoke. The ground-level ozone standard (8-hour) was exceeded on the 10th, 15th, 16th, and 23rd. All PM₁₀ and ozone exceedances were recorded at regulatory monitoring stations.

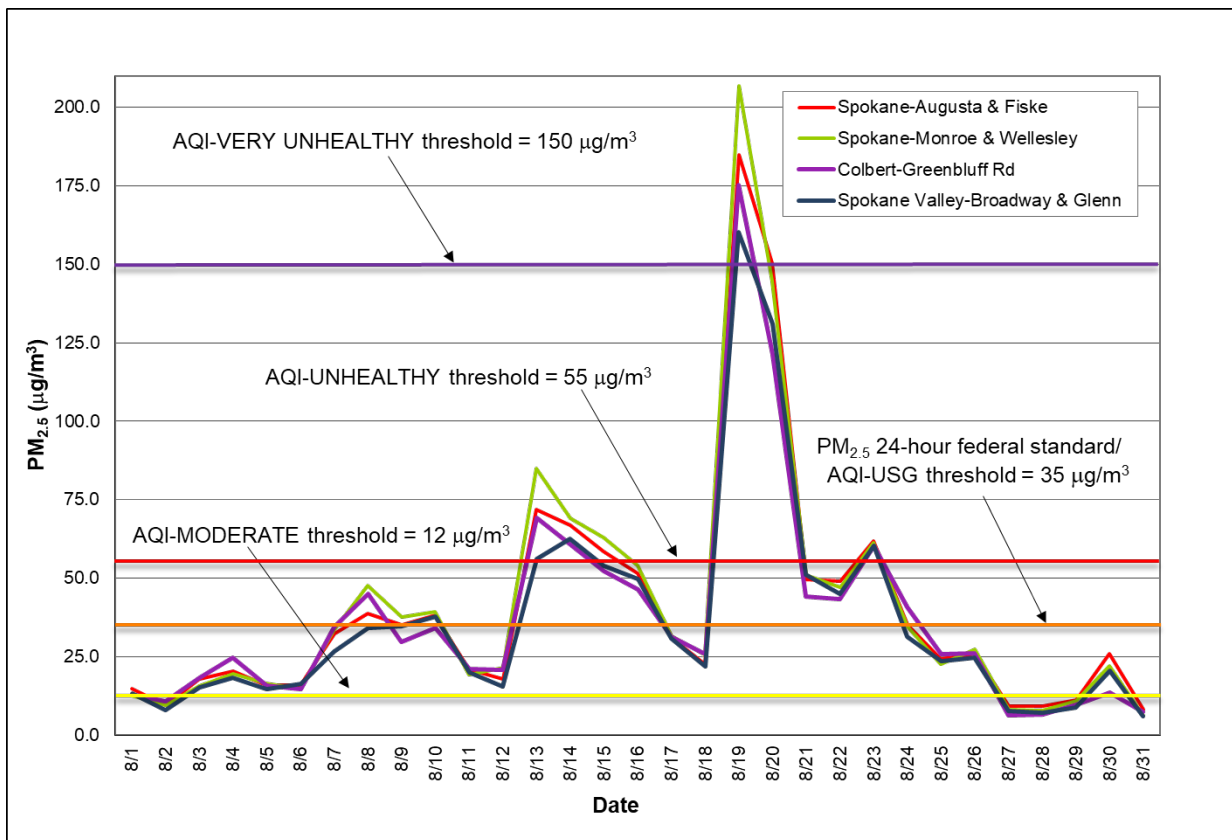
The worst air quality occurred on the 19th and 20th, after northerly and northeasterly winds carried heavy smoke from wildfires in British Columbia, north Idaho, and Montana into the local area. The Air Quality Index (AQI)

reached the Very Unhealthy range on the 19th with an index value of 257, based on a 24-hour average fine particulate matter (PM_{2.5}) mass concentration of 206.8 mg/m³ at the Spokane-Monroe & Wellesley monitoring station. The NowCast (current air quality; see <https://www.spokaneleanair.org/current-air-quality/air-quality-index-aqi>) index reached the hazardous category. Wind speeds increased on Monday the 20th, constricting the wildfire smoke plumes and improving air quality somewhat by late morning. Still, AQI-Unhealthy for Sensitive Groups or worse air quality persisted until the 25th.

Toward the end of the month, cooler temperatures and rain helped limit the smoke, effectively ending the wildfire smoke season for the Spokane area.

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.

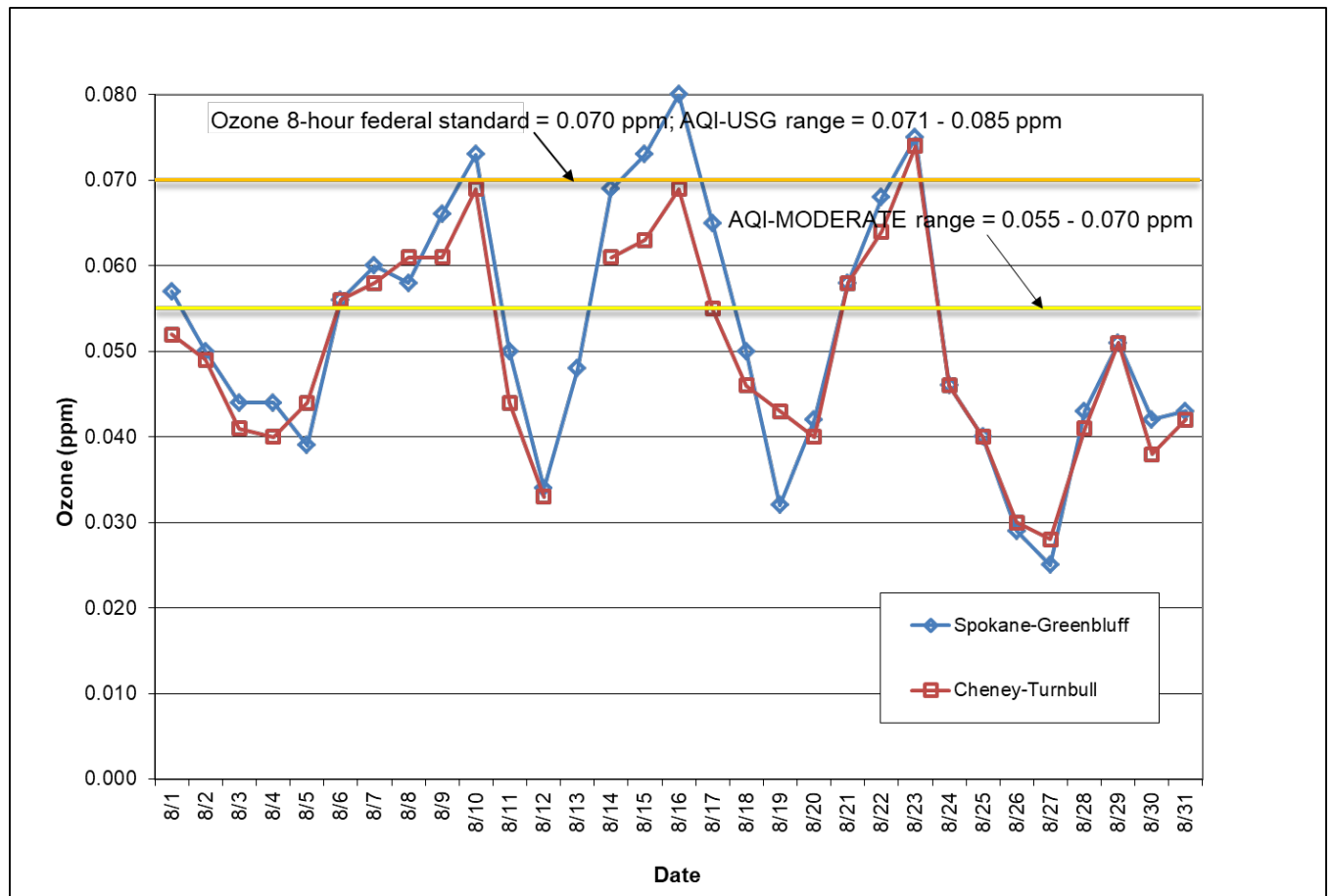
Figure 2: Multi-station 24-hour average PM_{2.5} for August 2018; Spokane County.



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. In Washington State, it is monitored May through September each year. The federal standard for ground-level ozone in ambient air (0.070 ppm) is based on an 8-hour average concentration (see Appendix 1).

The maximum 8-hour running average ozone concentration for the month was 0.080 ppm measured at Greenbluff on the 16th (Figure 3). Eight hour average ozone concentrations in the range 0.055 to 0.070 ppm are in the “Moderate” air quality category of the AQI and concentrations in the 0.071 to 0.085 ppm range are in the “Unhealthy for Sensitive Groups” category of the AQI. 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. The threshold for the moderate category of the AQI for ozone is 0.055 ppm averaged over eight hours. An ozone concentration of 0.070 ppm, averaged over eight hours, is the level of the federal ozone standard. Concentrations in the 0.071 to 0.085 ppm range are in the “Unhealthy for Sensitive Groups” category of the AQI, an exceedance of the federal ambient air quality standard for ozone. 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.



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	133/0.080 ppm	Spokane-Greenbluff	8/16
PM ₁₀	134/222 µg/m ³	Spokane, E. Augusta Ave (Augusta & Fiske)	8/19
PM _{2.5}	257/206.8 µg/m ³	Spokane, N. Monroe St (Monroe & Wellesley)	8/19

Table 2: Maximum AQI values and pollutant concentrations for calendar year 2018

Pollutant	AQI/Concentration	Location	Date
O ₃	133/0.080 ppm	Spokane-Greenbluff	8/16
PM ₁₀	134/222 µg/m ³	Spokane, E. Augusta Ave (Augusta & Fiske)	8/19
PM _{2.5}	257/206.8 µg/m ³	Spokane, N. Monroe St (Monroe & Wellesley)	8/19

Table 3: AQI summary as of August 31, 2018

Category	Number of Days This Year
Good (0-50)	187
Moderate (51-100)	43
Unhealthy for Sensitive Groups (101-150)	7
Unhealthy (151-200)	5
Very Unhealthy (201-300)	1
Hazardous (>300)	0

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 ($\mu\text{g}/\text{m}^3$). A tripped electrical circuit breaker caused a loss of data from Turnbull on the 13th and 14th.

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} 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	0.057	0.052	14.7	13.1	12.9	12.6	55	41
8/2	0.050	0.049	9.5	8.0	10.6	9.4	41	30
8/3	0.044	0.041	17.8	15.3	18.2	15.6	47	37
8/4	0.044	0.04	20.4	18.2	24.7	19.6	37	29
8/5	0.039	0.044	15.9	14.5	15.8	16.3	31	23
8/6	0.056	0.056	16.0	16.4	14.6	14.9	40	33
8/7	0.060	0.058	32.3	26.5	34.4	33.8	64	52
8/8	0.058	0.061	38.7	34.0	44.9	47.6	65	71
8/9	0.066	0.061	35.0	34.8	29.7	37.6	67	65
8/10	0.073	0.069	38.2	37.8	34.1	39.4	74	63
8/11	0.050	0.044	21.0	19.9	20.9	19.2	78	64
8/12	0.034	0.033	17.8	15.5	20.8	21.5	35	27
8/13	0.048		71.8	56.2	69.2	84.8	92	
8/14	0.069	0.061	66.8	62.4	60.8	69.1	98	
8/15	0.073	0.063	58.5	54.0	52.2	62.8	108	79
8/16	0.080	0.069	51.6	49.7	46.4	54.1	96	75
8/17	0.065	0.055	30.8	30.7	31.4	31.5	75	72
8/18	0.050	0.046	22.7	22.0	25.7	25.6	51	41
8/19	0.032	0.043	185.0	160.3	175.2	206.8	222	147
8/20	0.042	0.04	150.4	131.1	121.2	144.6	181	189
8/21	0.058	0.058	49.6	51.1	44.1	51.0	75	74
8/22	0.068	0.064	48.9	45.0	43.4	47.1	81	60
8/23	0.075	0.074	61.7	60.2	60.2	61.3	108	90
8/24	0.046	0.046	35.1	31.4	40.8	34.5	77	56
8/25	0.040	0.04	24.1	23.4	25.7	22.7	47	31
8/26	0.029	0.03	25.8	24.7	26.0	27.2	39	29
8/27	0.025	0.028	9.1	7.8	6.4	8.1	14	14
8/28	0.043	0.041	9.3	7.1	6.6	7.7	19	7
8/29	0.051	0.051	11.2	8.7	9.6	10.8	36	28
8/30	0.042	0.038	26.0	20.4	13.4	22.1	54	41
8/31	0.043	0.042	8.1	5.9	7.5	6.1	30	18
AVG	0.052	0.050	39.5	35.7	37.0	40.8	69	55
MAX	0.080	0.074	185.0	160.3	175.2	206.8	222	189