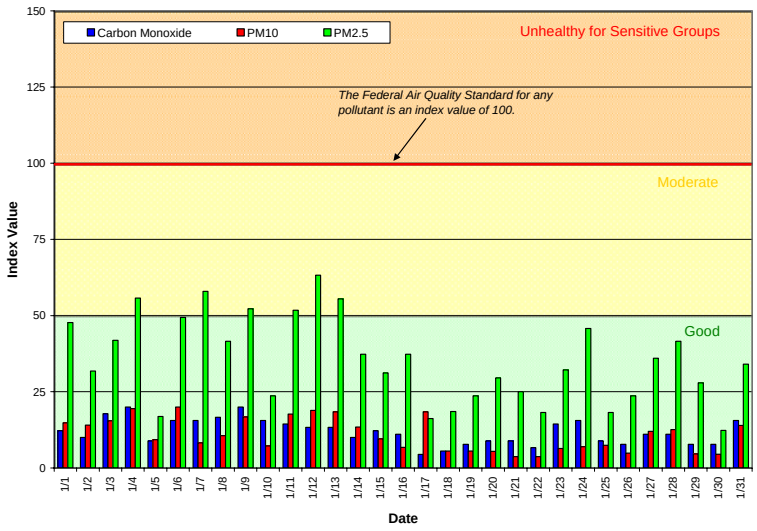
Spokane Regional Clean Air Agency
Air Quality Report - January 2012

Air quality in January varied as weather systems moved through the region at regular intervals. Storms on January 5, 10 and 14 helped cleanse ther region's air of fine particulate matter ($PM_{2.5}$) and other pollutants, while high pressure ridging between the storms inhibited atmospheric mixing and allowed air quality to deteriorate (Figures 1 and 2). The pattern continued for the second half of the month, but air quality did not deteriorate as much between storms.

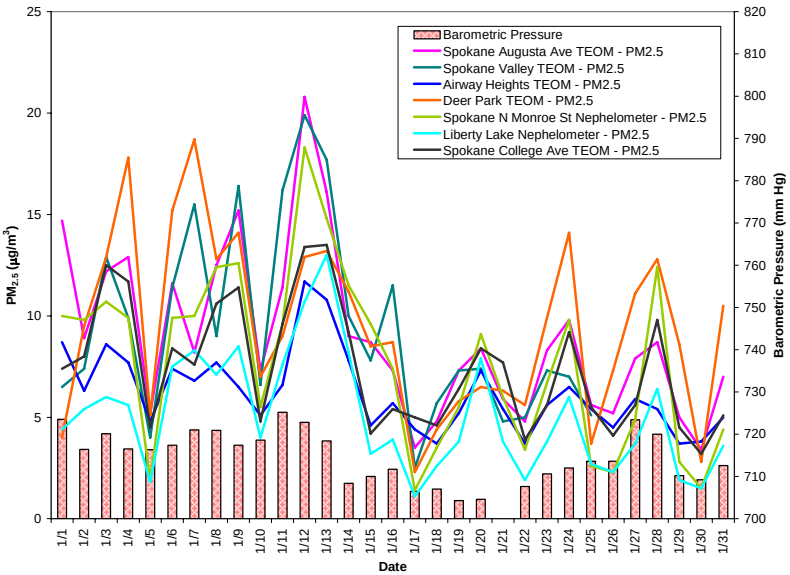
Ozone monitoring ended for the season on October 1 and will resume April 1, 2012. See Appendix 1 of this report for information about federal air quality standards or Appendix 2 for a description of the AQI.

Figure 1: Air Quality Index (AQI) values for January 2012



The $PM_{2.5}$ data used to determine the AQI and for other day-to-day operations are obtained using a network of automated particulate matter monitors consisting of Tapered Element Oscillating Microbalances (TEOM) and nephelometers. The barometric pressure data are obtained at Spokane Augusta & Fiske using the TEOM 1405-DF.

Figure 2: $PM_{2.5}$ multi-station time series for January 2012



The January daily air quality data for all monitoring stations in the Spokane region are provided in Appendix 3. Current and historical air quality data can be obtained electronically from Ecology via their air monitoring data website, https://fortress.wa.gov/ecy/enviwa/Default.htm. Ecology's site can also be accessed through the SRCAA's webpage, http://spokanecleanair.org/air_quality.asp. Select the link, "State Wide Air Monitoring Data." The Washington Air Quality Advisory (WAQA) on Ecology's webpage is similar to the AQI, which the SRCAA uses, but shows higher index values (increased health effects) at lower measured air pollution concentrations than the AQI.

Tables 1 and 2 contain the maximum AQI values for each pollutant for the month and for the year to date. Table 2 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
CO	20/1.8 ppm (8 hour)	Spokane, 3rd & Washington	1/4 & 1/9
PM_{10}	20/22 µg/m^3	Spokane, Augusta & Fiske	1/6
$PM_{2.5}$	63/20.8 µg/m^3	Spokane, Augusta & Fiske	1/12

Table 2: AQI summary as of January 31, 2012

Category	Number of Days This Year	Last Year to Date
Good (0-50)	25	24
Moderate (51-100)	67	7
Unhealthy for Sensitive Groups (101-150)	0	3
Unhealthy (151-200)	0	0
Very Unhealthy (201-300)	0	0
Hazardous (>300)	0	0

Stronger southerly (S) to west-southwesterly (WSW) winds promoted better air quality and decreased fine particulate matter ($PM_{2.5}$) concentrations when weather systems were moving through the region (Figures 3 and 4). The $PM_{2.5}$ concentrations increased, i.e., air quality deteriorated, with lighter winds from other directions associated with the periods of more stable atmospheric conditions.

Figure 3: The wind rose depicts the variation of hourly average wind speed (mph) with the direction from which the wind was blowing in January.

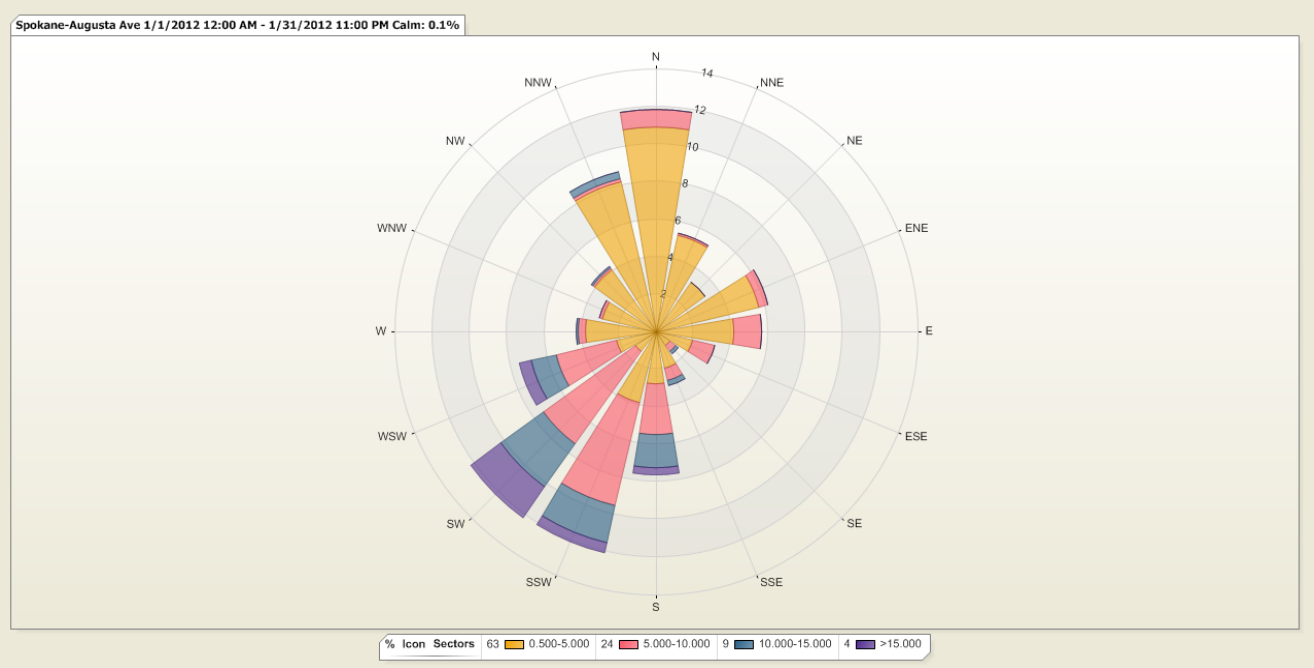
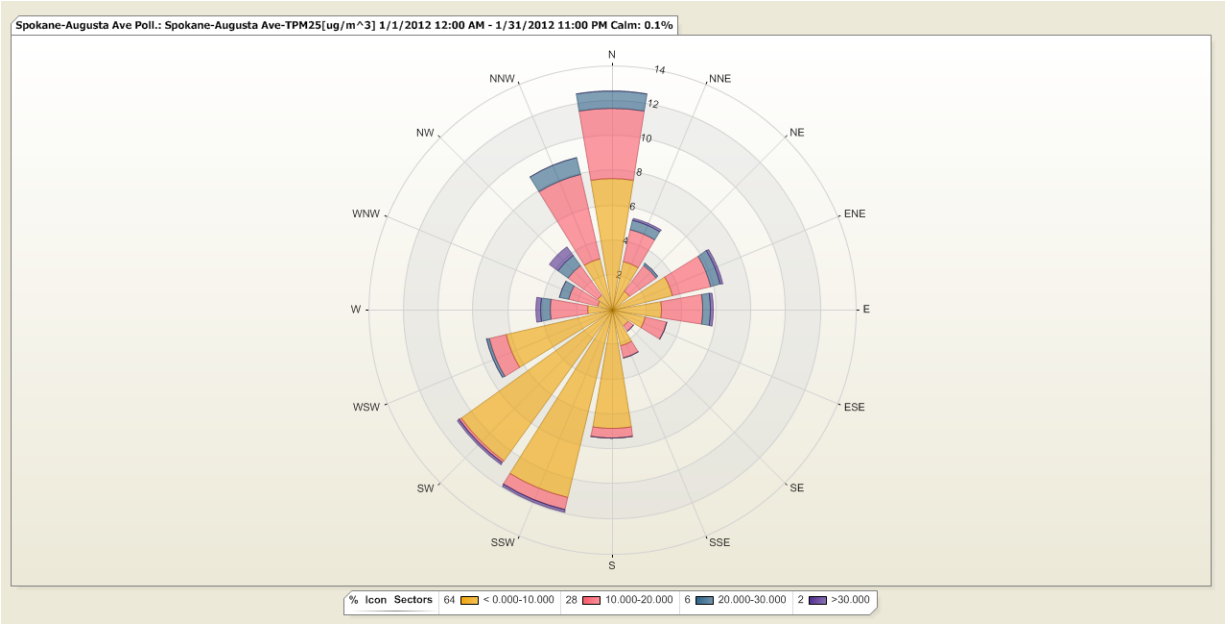


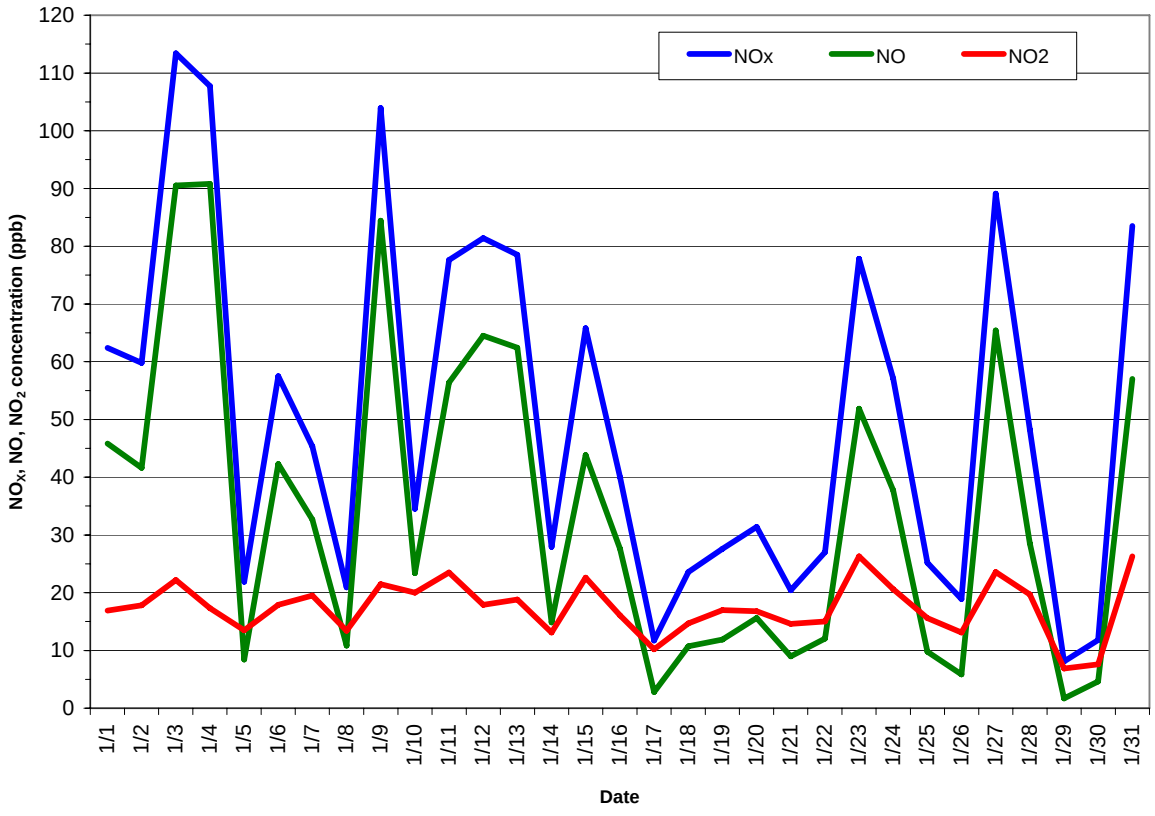
Figure 4: The $PM_{2.5}$ pollution rose depicts the variation of hourly average $PM_{2.5}$ ($\mu g/m^3$) with the direction from which the wind was blowing in January.



Nitrogen oxides (NO_x) are a group of highly reactive gases that contain nitrogen and oxygen. In ambient air, they consist primarily of nitric oxide (NO) and nitrogen dioxide (NO_2). The 2005 emissions inventory estimated that, on an annual basis, 59% of NO_x emissions in Spokane County are from on-road mobile sources, cars and trucks, and 24% are from non-road mobile sources, e.g., construction heavy equipment. The remaining 17% comes from a variety of sources, such as natural emissions from soil and vegetation (6%), industrial, commercial and institutional point sources (5%), residential fuel use (4%), e.g., natural gas and oil for heating and cooking, wood stoves and fireplaces (1%) and open burning, wildfires and structure and vehicle fires (1%). Nitrogen oxides react with volatile organic compounds (VOCs) in the presence of sunlight to form ozone.

The SRCAA monitors nitrogen oxides and VOCs in the form of methane and non-methane hydrocarbons at the Spokane Augusta & Fiske monitoring station. Hydrocarbon ambient concentrations are very low in the colder months of the year and are not included in this report. The data are available from the SRCAA by request. Nitrogen dioxide is a criteria air pollutant defined in the NAAQS (see Appendix 1 of this report), but is not a significant problem in the Spokane area. The one-hour maximum concentrations of NO_2 monitored in January at the Augusta & Fiske monitoring station remained below the federal 1-hour standard of 100 ppb (Figure 5).

<u>Figure 5</u>: One hour maximum concentrations of nitrogen oxides for the Spokane Augusta & Fiske monitoring station in January. The federal standard daily 1-hour maximum for nitrogen dioxide (NO_2) is 100 ppb. The NAAQS does not set limits on the other air pollutants shown here.



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 (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), ground-level ozone (O_3) and sulfur dioxide (SO_2; 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

	Primary Standards		Secondary Standards	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour [1]	None	
	35 ppm (40 mg/m^3)	1-hour [1]		
Lead	0.15 µg/m^3 [2]	Rolling 3-Month Average	Same as Primary	
	1.5 µg/m^3	Quarterly Average	Same as Primary	
Nitrogen Dioxide	53 ppb [3]	Annual (Arithmetic Average)	Same as Primary	
	100 ppb	1-hour [4]	None	
Particulate Matter (PM_{10})	150 µg/m^3	24-hour [5]	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual [6] (Arithmetic Average)	Same as Primary	
	35 µg/m^3	24-hour [7]	Same as Primary	
Ozone	0.075 ppm (2008 std)	8-hour [8]	Same as Primary	
	0.08 ppm (1997 std)	8-hour [9]	Same as Primary	
	0.12 ppm	1-hour [10]	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Average)	0.5 ppm	3-hour [1]
	0.14 ppm	24-hour [1]		
	75 ppb [11]	1-hour	None	

[1] Not to be exceeded more than once per year.
[2] Final rule signed October 15, 2008.
[3] The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard
[4] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).
[5] Not to be exceeded more than once per year on average over 3 years.
[6] To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.
[7] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).
[8] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)
[9] (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(c) EPA is in the process of reconsidering these standards (set in March 2008).
[10] (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").
(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1.
[11] (a) Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

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	O_3 (ppm) 1-hour[1]	$PM_{2.5}$ ($\mu g/m^3$) 24-hour	PM_{10} ($\mu g/m^3$) 24-hour	CO (ppm) 8-hour	
Good	Green	0-50	0.000-0.059	[3]	0.0-15.4	0-54	0.0-4.4	Air quality is considered satisfactory and air pollution poses little or no risk.
Moderate	Yellow	51-100	0.060-0.075	[3]	15.5-35.4	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	0.076-0.095	0.125-0.164	35.5-65.4	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	0.096-0.115	0.165-0.204	65.5-150.4	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	0.116-0.374	0.205-0.404	150.5-250.4	355-424	15.5-30.4	Health alert: everyone may experience more serious health effects.
Hazardous	Maroon	>300	[2]	0.405+	250.5+	425+	30.5+	Health warnings of emergency conditions. The entire population is more likely to be affected.

[1]Areas are generally required to report the AQI based on 8-hour ozone values. However, there are a small number of areas where an AQI based on 1-hour ozone values would be more precautionary. In these cases, in addition to calculating the 8-hour ozone index value, the 1-hour ozone index value may be calculated, and the maximum of the two values reported.

[2]8-hour O_3 values do not define higher AQI values ($\geq$ 301). AQI values of 301 or greater are calculated with 1-hour O_3 concentrations.

[3]There is no AQI for 1-hour O_3 concentrations below the Unhealthy for Sensitive Groups level.

Appendix 3

Table A-3: Summary air quality data for January for air monitoring stations in Spokane County. The carbon monoxide and ozone data are 8-hour maximums in parts per million (ppm) and the PM data are 24-hour averages in micrograms per cubic meter of air (µg/m^3).

Date	CO 3rd & Washington (8 hour max, ppm)	PM2.5 Augusta & Fiske TEOM (µg/m3)	PM2.5 Augusta & Fiske TEOM 1405-DF (µg/m3)	PM2.5 College Ave TEOM (µg/m3)	PM2.5 Deer Park TEOM (µg/m3)	PM2.5 Spokane Valley TEOM (µg/m3)	PM2.5 Airway Heights TEOM (µg/m3)	PM2.5 Monroe & Wellesley nephelometer (µg/m3)	PM2.5 Liberty Lake nephelometer (µg/m3)	PMcoarse Augusta & Fiske TEOM 1405-DF (µg/m3)	PM10 Augusta & Fiske TEOM 1405-DF (µg/m3)	PM10 Turnbull NWR TEOM (µg/m3)
1/1	1.1	14.7	10.3	7.4	4.0	6.5	8.7	10.0	4.4	7	16	5
1/2	0.9	8.9	7.0	8.0	9.5	7.4	6.3	9.8	5.4	8	15	6
1/3	1.6	12.2	7.8	12.5	12.9	12.9	8.6	10.7	6.0	9	17	4
1/4	1.8	12.9	9.9	11.7	17.8	9.9	7.7	9.9	5.6	11	21	4
1/5	0.8	5.2	2.7	4.5	5.1	4.0	4.8	1.9	1.8	8	10	7
1/6	1.4	11.6	8.8	8.4	15.2	11.4	7.4	9.9	7.5	13	22	4
1/7	1.4	8.2	5.5	7.6	18.7	15.5	6.8	10.0	8.3	5	9	7
1/8	1.5	12.5	9.2	10.6	12.8	9.0	7.7	12.4	7.1	2	12	4
1/9	1.8	15.2	12.1	11.4	14.1	16.4	6.5	12.6	8.5	6	18	5
1/10	1.4	7.3	4.7	4.8	7.0	6.6	5.1	5.5	4.0	3	8	5
1/11	1.3	11.4	9.5	9.6	9.0	16.2	6.6	9.6	7.6	10	19	6
1/12	1.2	20.8	13.7	13.4	12.9	19.9	11.7	18.3	10.7	7	20	8
1/13	1.2	16.1	12.6	13.5	13.2	17.7	10.8	14.8	13.0	7	20	13
1/14	0.9	9.0	8.3	9.2	11.2	10.0	7.8	11.5	8.2	6	15	10
1/15	1.1	8.7	5.9	4.2	8.5	7.8	4.6	9.6	3.2	6	10	4
1/16	1.0	7.3	5.5	5.4	8.7	11.5	5.7	7.4	3.9	5	7	5
1/17	0.4	3.5		5.0	2.3	2.5	4.4	1.4	1.1	19	20	19
1/18	0.5	4.8	4.0	4.6	4.4	5.7	3.7	3.5	2.6	2	5	6
1/19	0.7	7.3	4.0	6.4	5.8	7.3	5.2	5.5	3.8	1	4	6
1/20	0.8	8.4	7.5	8.4	6.5	7.4	7.3	9.1	7.9	1	6	4
1/21	0.8	5.9	3.7	7.7	6.3	4.8	5.4	6.0	3.8	1	4	4
1/22	0.6	4.8		3.9	5.6	5.0	3.7	3.4	1.9	2	3	4
1/23	1.3	8.3	4.6	5.6	9.9	7.3	5.6	6.7	3.8	3	7	5
1/24	1.4	9.8	7.1	9.2	14.1	7.0	6.5	9.8	6.0	1	8	5
1/25	0.8	5.6	3.0	5.5	3.7	5.1	5.4	2.6	2.7	3	4	8
1/26	0.7	5.2	2.9	4.1	7.3		4.5	2.3	2.3	3	5	5
1/27	1.0	7.9	3.5	5.6	11.1		5.9	4.9	3.7	10	13	5
1/28	1.0	8.7	6.8	9.8	12.8		5.4	12.4	6.4	7	14	6
1/29	0.7	5.0	2.9	4.5	8.6		3.7	2.8	1.9	2	4	5
1/30	0.7	3.4	2.2	3.2	2.8		3.8	1.5	1.5	3	5	3
1/31	1.4	7.0	6.1	5.1	10.5		5.0	4.4	3.6	10	15	4
AVG	1.1	9.0	6.6	7.4	9.4	9.4	6.2	7.7	5.1	5.7	11.4	6.0
MAX	1.8	20.8	13.7	13.5	18.7	19.9	11.7	18.3	13.0	19	22	19