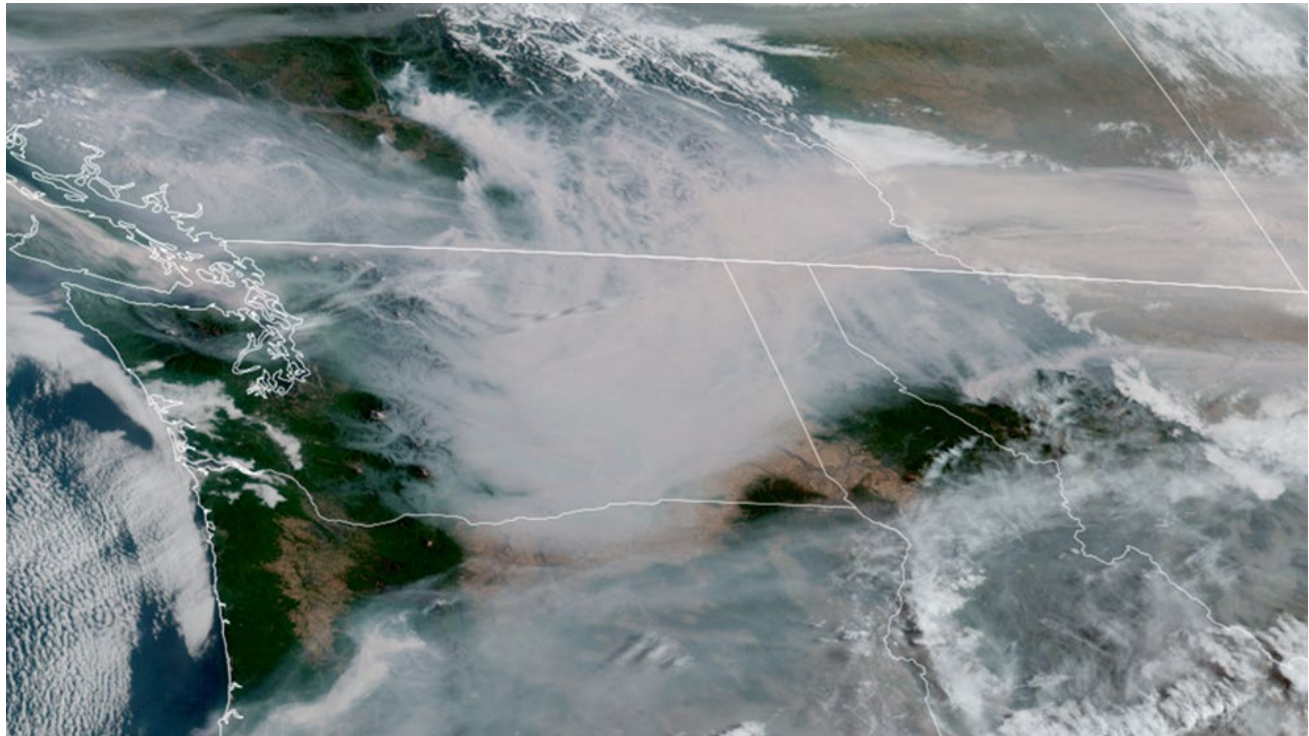


## Spokane Regional Clean Air Agency Air Quality Report - August 2023

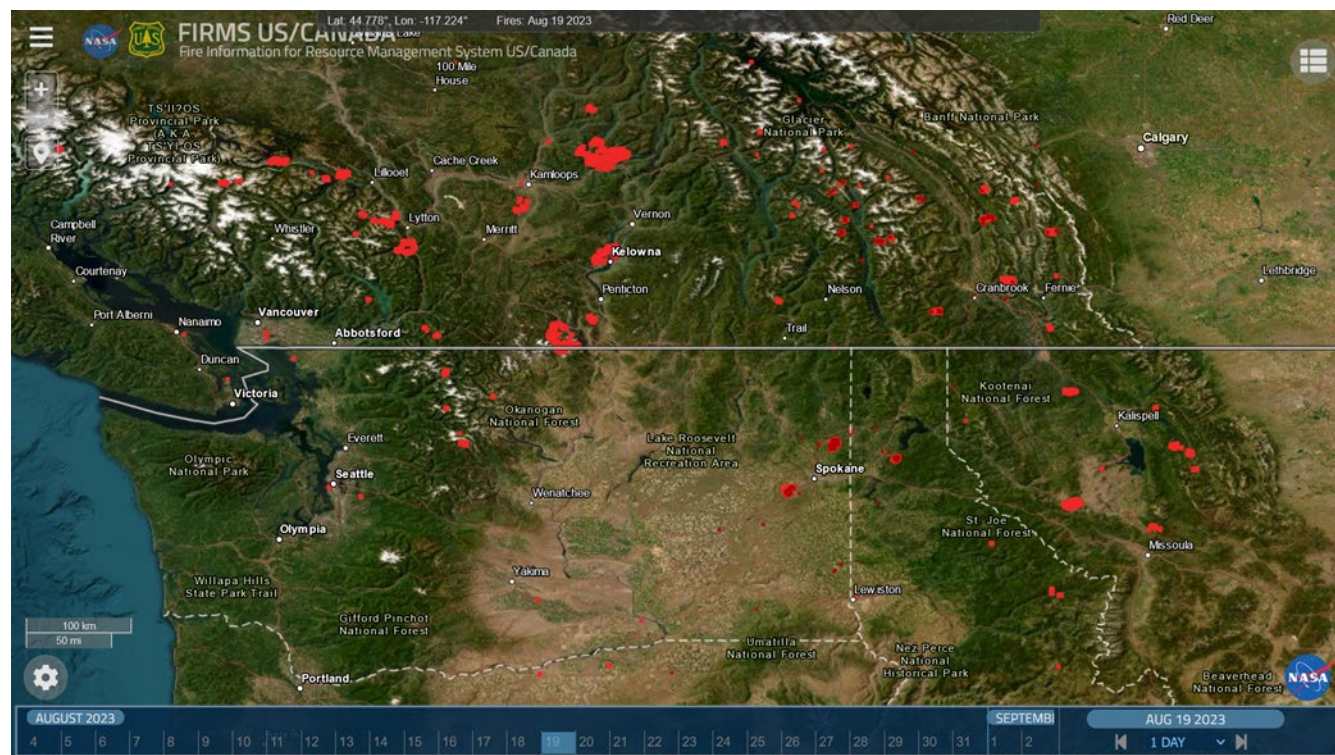
Smoke from widespread fires in British Columbia and local fires (Gray, Oregon Road, and Ridge Creek fires) pushed the Spokane area's Air Quality Index (AQI) to HAZARDOUS levels during the weekend of August 19<sup>th</sup> and 20<sup>th</sup> (**Figures 1, 2, and 3**). The maximum daily (midnight-to-midnight) AQI recorded in August was 368 (PM<sub>2.5</sub> 24-hour average mass concentration = 317.7 µg/m<sup>3</sup>) at Greenbluff, north of the Spokane-Spokane Valley urban area, on Saturday, the 19<sup>th</sup> (**Figure 4**). The only other time wildfire smoke pushed the AQI to HAZARDOUS levels was in September 2020.

**Figure 1:** Satellite image from August 19<sup>th</sup> showing smoke from wildfires in British Columbia infiltrating the U.S. Pacific Northwest (courtesy of the Regional and Mesoscale Meteorology Branch (RAMMB) of NOAA/NESDIS and the Cooperative Institute for Research in the Atmosphere (CIRA) at Colorado State University).



The hottest days of the summer were August 14<sup>th</sup> through the 17<sup>th</sup> with maximum daily temperatures ranging from the upper 90s to 105 °F. The stretch of hot weather was followed on the 18<sup>th</sup> by strong winds gusting up to 37 mph which were associated with an upper-level weather disturbance/dry cold front. The extremely dry conditions (relative humidity was as low as 6%) and gusty winds led to the outbreak of two rapidly-spreading fires in Spokane County. The Gray fire started near Medical Lake and burned through the Silver Lake area and crossed Interstate 90, burning over 10,000 acres between the afternoon of the 18<sup>th</sup> and the afternoon of the 20<sup>th</sup>. The Oregon Road fire near Elk burned over 10,000 acres in northern Spokane County during the same time period. Both areas, including the City of Medical Lake, were under Level 3 Evacuation 'Leave Now' orders. The fires burned hundreds of structures, including homes, and caused two fatalities. Another local fire, the Ridge Creek fire had been burning northeast of Hayden Lake in Idaho since August 3<sup>rd</sup> and had burned 4,474 acres as of September 8<sup>th</sup>. PM<sub>2.5</sub> readings exceeded the 24-hour federal air quality standard (35 µg/m<sup>3</sup>) on the 18<sup>th</sup>, 19<sup>th</sup>, 20<sup>th</sup>, and 21<sup>st</sup> (**Figure 5**).

**Figure 2:** NASA/USFS Fire Information for Resource Management System (FIRMS) map showing locations of fires in red on August 19. Note the fires around Spokane (Gray, Oregon Road, and Ridge Creek fires) just right of center on the map and the widespread fires in southern British Columbia. The Gray fire is marked by the red area southwest of Spokane, the Oregon Road fire is the red area north-northeast of Spokane, and the Ridge Creek fire is east of Spokane in Idaho.

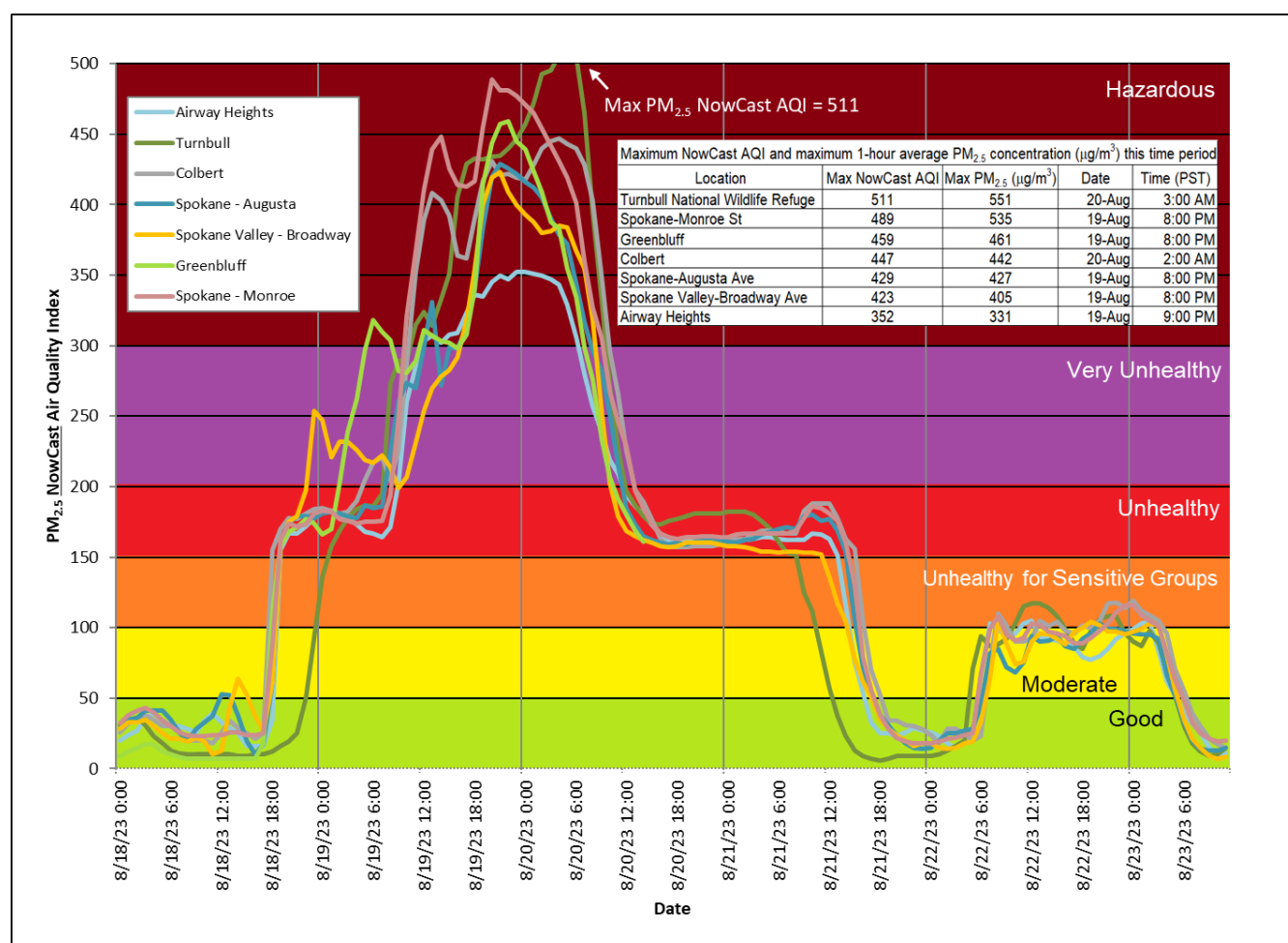


The maximum daily AQI value for PM<sub>10</sub> was 164 (UNHEALTHY), which was recorded at the Spokane Valley – Broadway & Glenn monitoring station on the 19<sup>th</sup>. PM<sub>10</sub> readings exceeded the 24-hour federal air quality standard (150 µg/m<sup>3</sup>) on the 19<sup>th</sup> and 20<sup>th</sup> (**Figure 6**). The maximum daily AQI value for ozone pollution was 88 (MODERATE), which was based on an 8-hour average ozone concentration of 0.066 ppm recorded at Turnbull National Wildlife Refuge on the 19<sup>th</sup> (**Figure 7**). There were ten GOOD air quality days in August, seventeen MODERATE days, and one day in each of the UNHEALTHY FOR SENSITIVE GROUPS, UNHEALTHY, VERY UNHEALTHY, and HAZARDOUS AQI categories (**Table 1**). PM<sub>2.5</sub>, PM<sub>10</sub>, and ozone pollution levels were the highest recorded this year (**Table 2**).

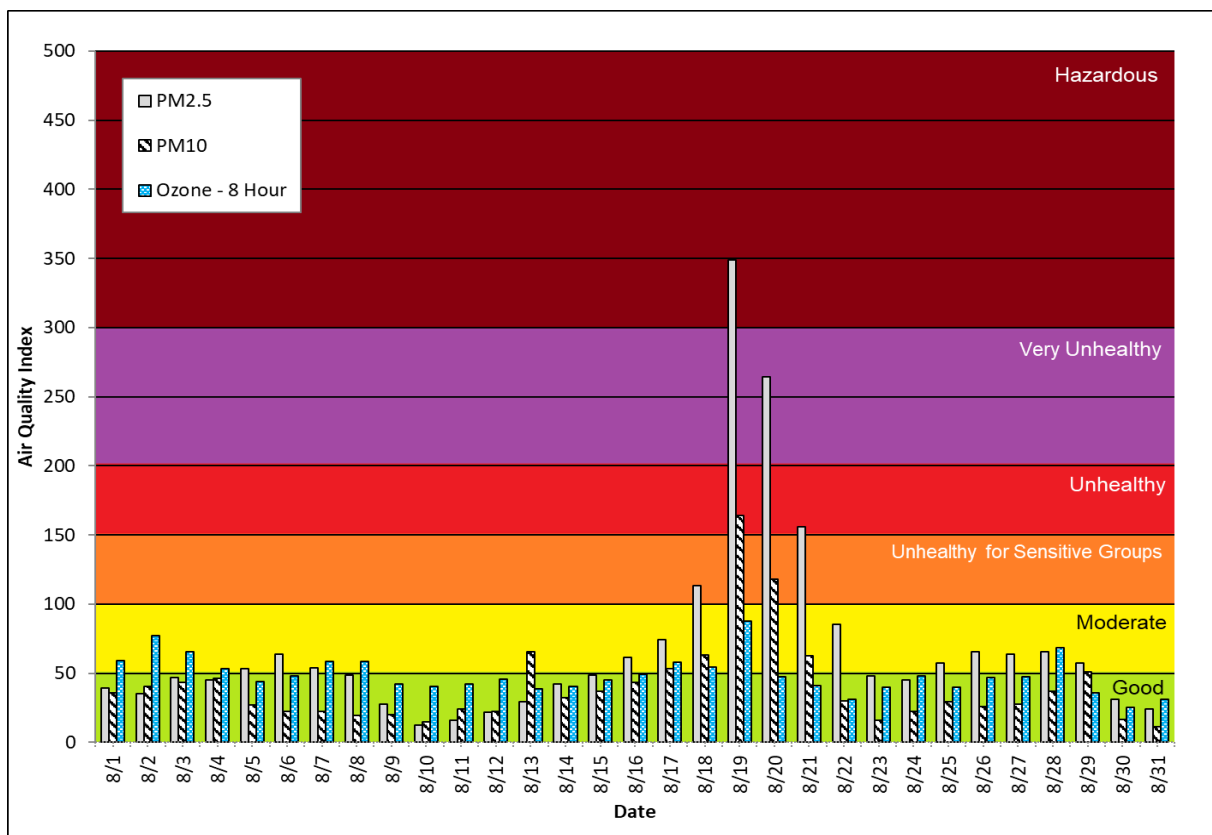
See Appendix 1 of this report for information about federal air quality standards, Appendix 2 for a description of the AQI, or Appendix 3 for a summary of daily PM<sub>2.5</sub> and PM<sub>10</sub> mass concentrations and AQIs across the Spokane-area ambient air monitoring network. Current and historical ambient air quality data can also be obtained from the Washington State Department of Ecology’s air monitoring data website, <https://enviwa.ecology.wa.gov/home/map>.



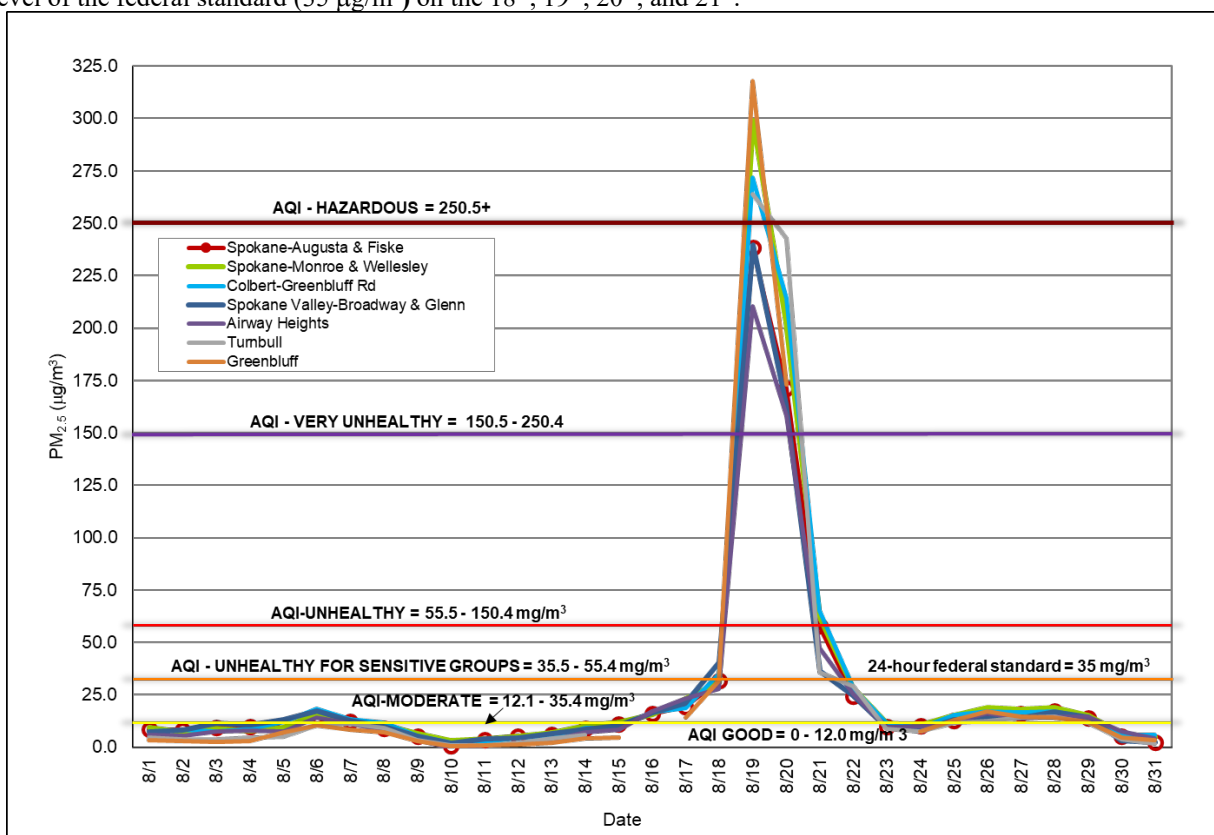
**Figure 3: NowCast AQI for Spokane County PM<sub>2.5</sub> monitoring stations, August 18-23.** The NowCast AQI, which updates each hour, is a version of the AQI that is used to inform the public about changing air quality in near-real-time (as it is happening). The NowCast AQI is reported on the Spokane Clean Air website as “current air quality” (<https://spokanecleanair.org/air-quality/current-air-quality/>). For PM<sub>2.5</sub>, the standard AQI is based on the 24-hour (midnight-to-midnight) average mass concentration. It uses the same 0 to 500 scale as the standard AQI. The NowCast quickly rose from the GOOD air quality category to UNHEALTHY and VERY UNHEALTHY across Spokane County over the course of a few hours in the evening of Friday the 18<sup>th</sup>. Air quality continued to deteriorate as more smoke accumulated on Saturday the 19<sup>th</sup>. The NowCast was in the HAZARDOUS category for much of the 19<sup>th</sup> and 20<sup>th</sup>. Pollution levels started dropping after upper-level weather disturbance brought a change in wind direction later in the day on the 20<sup>th</sup>. Air quality was GOOD by the evening of Monday the 21<sup>st</sup> when southeasterly winds cleared the area of wildfire smoke. On the 22<sup>nd</sup>, southwesterly winds carried residual smoke from the Columbia Basin and new smoke from Oregon fires into the Spokane area, resulting in about 24 hours of MODERATE to UNHEALTHY FOR SENSITIVE GROUPS air quality levels. The maximum NowCast reading for the period was 511 (beyond HAZARDOUS). The imbedded table provides the maximum NowCast AQI value and maximum 1-hour average PM<sub>2.5</sub> mass concentration recorded at each air monitoring station for the period. Elsewhere in this report, AQI means the daily AQI. For more information about the NowCast, see <https://www.airnow.gov/aqi/aqi-basics/using-air-quality-index/>.



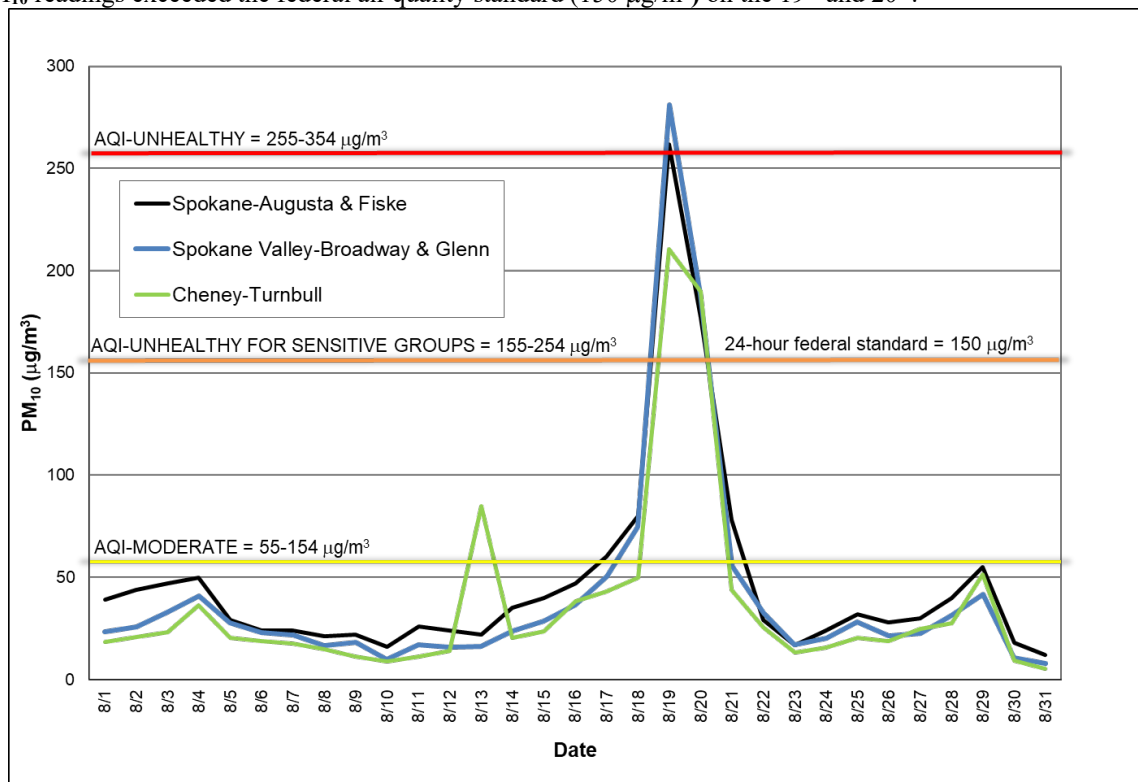
**Figure 4: Daily Air Quality Index (AQI) values for August 2023.** The data represent the maximum AQI values across all monitoring stations within Spokane County based on 24-hour average  $PM_{2.5}$  and  $PM_{10}$  concentrations and maximum daily 8-hour average ozone concentrations. Air pollution was elevated during the August 18-22 wildfire smoke incursion into the Spokane area. The maximum AQI for August was 368 (Hazardous), a result of  $PM_{2.5}$  pollution on the 19<sup>th</sup>.



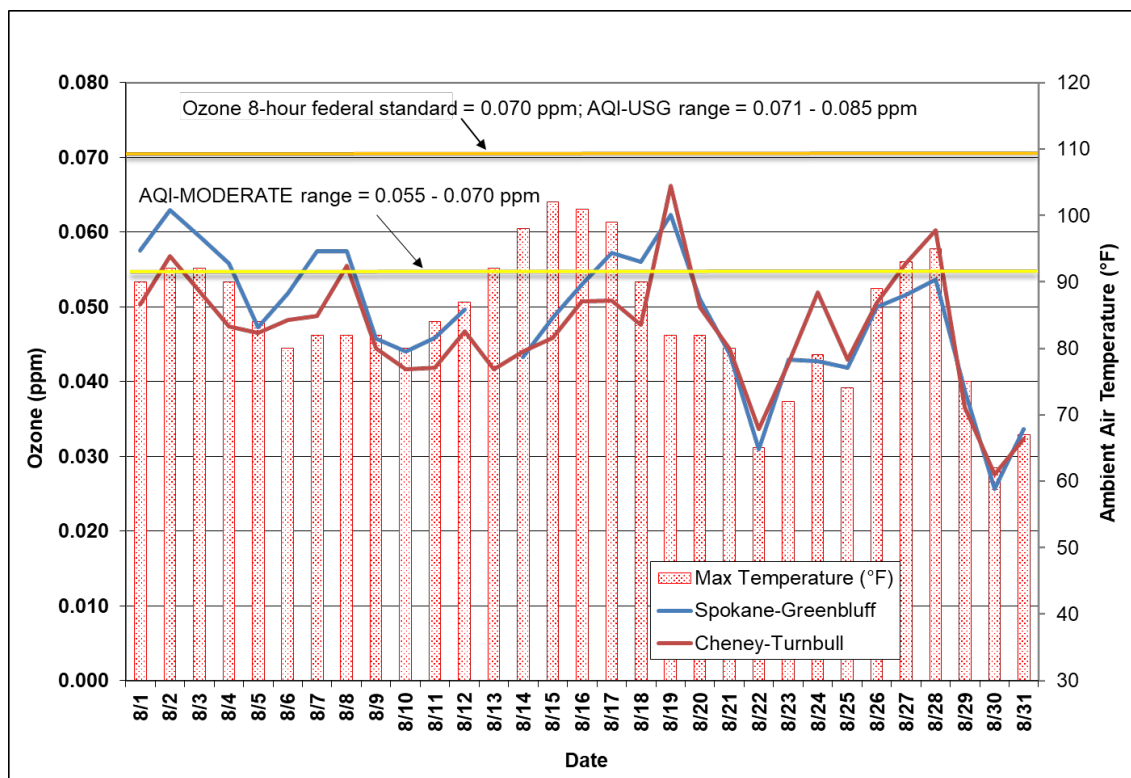
**Figure 5: Multi-station 24-hour average  $PM_{2.5}$  for August 2023; Spokane County.**  $PM_{2.5}$  pollution readings exceeded the level of the federal standard ( $35 \mu\text{g}/\text{m}^3$ ) on the 18<sup>th</sup>, 19<sup>th</sup>, 20<sup>th</sup>, and 21<sup>st</sup>.



**Figure 6: Multi-station 24-hour average PM<sub>10</sub> for August 2023; Spokane County.** Elevated readings on the 19<sup>th</sup> and 20<sup>th</sup> were caused by wildfire smoke. The smaller PM<sub>10</sub> spike which occurred at Turnbull on the 13<sup>th</sup> was caused by road maintenance performed that day by the U.S. Fish and Wildlife Service at Turnbull National Wildlife Refuge. The maximum 24-hour average mass concentration was 281  $\mu\text{g}/\text{m}^3$ , which was recorded at Spokane Valley – Broadway & Glenn on the 19<sup>th</sup>. PM<sub>10</sub> readings exceeded the federal air quality standard (150  $\mu\text{g}/\text{m}^3$ ) on the 19<sup>th</sup> and 20<sup>th</sup>.



**Figure 7: Eight-hour maximum ozone concentrations for the Spokane region in August.** The maximum 8-hour average concentration was 0.066 ppm, which was recorded at Turnbull National Wildlife Refuge on the 19<sup>th</sup>. Ozone measurements did not exceed the 0.070 ppm 8-hour federal standard in August. Maximum ambient air temperature is also plotted here because it is an important factor in the formation of ozone pollution and because temperature is directly affected by solar radiation, another important factor in the formation of ozone.



**Table 1: AQI summary, August 2023.** The number of days in August and in 2023 (through August) in each AQI category based on PM<sub>2.5</sub>, PM<sub>10</sub>, and ozone readings from Spokane Clean Air and Washington State Department of Ecology air monitoring stations across Spokane County.

Category	Number of days in August	Number of days this year to date
Good (0-50)	10	183
Moderate (51-100)	17	55
Unhealthy for Sensitive Groups (101-150)	1	1
Unhealthy (151-200)	1	2
Very Unhealthy (201-300)	1	1
Hazardous (>300)	1	1

**Table 2: Maximum AQI values and pollutant concentrations for this reporting period and this year.**

Pollutant	AQI		Location	Date
Ozone	88 (conc. = 0.066 ppm)	Moderate	Turnbull National Wildlife Refuge	8/19
PM <sub>10</sub>	164 (mass conc. = 281 µg/m <sup>3</sup> )	Unhealthy	Spokane Valley – Broadway & Glenn	8/19
PM <sub>2.5</sub>	368 (mass conc. = 317.7 µg/m <sup>3</sup> )	Hazardous	Spokane – Greenbluff	8/19

## 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<sub>2</sub>), particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), ground-level ozone (O<sub>3</sub>) and sulfur dioxide (SO<sub>2</sub>; 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
<a href="#">Carbon Monoxide (CO)</a>		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
<a href="#">Lead (Pb)</a>		primary and secondary	Rolling 3 month period	0.15 µg/m <sup>3</sup> <a href="#">(1)</a>	Not to be exceeded
<a href="#">Nitrogen Dioxide (NO<sub>2</sub>)</a>		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb <a href="#">(2)</a>	Annual Mean
<a href="#">Ozone (O<sub>3</sub>)</a>		primary and secondary	8 hours	0.070 ppm <a href="#">(3)</a>	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
<a href="#">Particle Pollution (PM)</a>	PM <sub>2.5</sub>	primary	1 year	12.0 µg/m <sup>3</sup>	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m <sup>3</sup>	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m <sup>3</sup>	98th percentile, averaged over 3 years
	PM <sub>10</sub>	primary and secondary	24 hours	150 µg/m <sup>3</sup>	Not to be exceeded more than once per year on average over 3 years
<a href="#">Sulfur Dioxide (SO<sub>2</sub>)</a>		primary	1 hour	75 ppb <a href="#">(4)</a>	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/m<sup>3</sup> as a calendar quarter average) also remain in effect.

(2) The level of the annual NO<sub>2</sub> 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) O<sub>3</sub> standards additionally remain in effect in some areas. Revocation of the previous (2008) O<sub>3</sub> standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) The previous SO<sub>2</sub> 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 SO<sub>2</sub> standards or is not meeting the requirements of a SIP call under the previous SO<sub>2</sub> 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 required 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” (USG; 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 <sub>3</sub> (ppm) 8-hour	PM <sub>2.5</sub> (µg/m <sup>3</sup> ) 24-hour	PM <sub>10</sub> (µg/m <sup>3</sup> ) 24-hour	CO (ppm) 8-hour	
<b>Good</b>	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.
<b>Moderate</b>	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.
<b>Unhealthy for Sensitive Groups</b>	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.
<b>Unhealthy</b>	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.
<b>Very Unhealthy</b>	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.
<b>Hazardous</b>	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: August summary air quality data for air monitoring stations in Spokane County.** Maximum daily 8-hour average ozone concentrations are reported in parts per million (ppm). Particulate matter mass concentration is reported as 24-hour averages in micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ). See Appendix 2 for an explanation of the Air Quality Index.

Pollutant Concentration												
Date	Ozone (ppm)		PM <sub>2.5</sub> (mg/m3)							PM <sub>10</sub> (mg/m3)		
	8-Hour Avg		24-Hour Avg							24-Hour Avg		
	Ozone - Turnbull NWR	Ozone - Greenbluff	PM2.5 - Airway Heights, 12th & Lawson	PM2.5 - Colbert, E Greenbluff Rd	PM2.5 - Spokane, Augusta & Fiske	PM2.5 - Spokane Valley, Broadway & Glenn	PM2.5 - Spokane, Monroe & Wellesley	PM2.5 - Turnbull NWR (temporary sensor)	PM2.5 - Greenbluff (temporary sensor)	PM10 - Spokane, Augusta & Fiske	PM10 - Spokane Valley, Broadway & Glenn	PM10 - Turnbull NWR
8/1	0.050	0.058	5.8	7.5	8.5	7.2	9.4	4.6	3.2	39	23.2	19
8/2	0.057	0.063	5.4	8.4	8.2	8.2	7.3	3.6	3.0	44	26	21
8/3	0.052	0.060	7.4	7.5	9.4	11.3	8.9	3.6	2.7	47	33	23
8/4	0.047	0.056	7.9	8.7	9.6	10.8	7.7	4.6	2.9	50	41	36
8/5	0.047	0.047	7.6	12.2	9.2	13.2	9.2	5.0	7.0	29	28	21
8/6	0.048	0.052	14.0	18.1	14.8	17.1	15.9	10.3	10.4	24	23	19
8/7	0.049	0.057	11.2	13.5	12.1	12.5	12.9	11.1	8.4	24	22	18
8/8	0.056	0.057	8.1	11.7	8.8	9.6	10.6	9.1	7.2	21	17	15
8/9	0.045	0.046	3.4	5.5	5.4	5.3	6.6	3.6	3.1	22	18	11
8/10	0.042	0.044	-0.5	2.3	0.7	2.0	3.0	0.8	0.6	16	10	9
8/11	0.042	0.046	1.0	2.2	3.7	3.8	3.8	1.1	1.0	26	17	11
8/12	0.047	0.050	1.7	4.6	5.3	4.5	5.2	2.0	1.4	24	16	14
8/13	0.042		3.2	5.0	6.2	6.3	7.0	4.2	2.0	22	16	85
8/14	0.044	0.043	7.0	9.1	8.9	8.7	10.1	5.8	4.0	35	24	21
8/15	0.046	0.049	8.5	9.0	11.2	10.3	11.7		4.4	40	29	24
8/16	0.051	0.053	17.2	16.5	16.0	16.6	15.6			47	37	38
8/17	0.051	0.057	23.2	18.6	19.5	21.1	23.0		14.2	60	50	43
8/18	0.048	0.056	28.0	34.7	31.7	40.5	31.1		31.7	80	75	50
8/19	0.066	0.062	210.2	271.6	238.4	239.7	299.0	263.9	317.7	262	281	211
8/20	0.050	0.051	158.1	214.3	171.0	163.8	202.6	242.9	173.1	177	188	190
8/21	0.044	0.044	47.3	65.1	57.9	36.3	61.8	35.6		78	56	44
8/22	0.034	0.031	25.2	28.4	24.5	24.7	28.4	29.0		29	33	26
8/23	0.043	0.043	9.6	11.5	9.7	9.2	11.5	8.6		17	17	13
8/24	0.052	0.043	10.2	9.3	10.2	7.6	10.8	7.4	7.7	24	20	16
8/25	0.043	0.042	12.1	15.2	12.7	13.2	15.0	11.9	12.9	32	28	21
8/26	0.051	0.050	16.2	17.0	15.6	14.1	19.0	12.5	16.9	28	21	19
8/27	0.056	0.052	13.8	16.7	16.2	14.0	18.1	14.3	14.7	30	23	25
8/28	0.060	0.054	14.6	17.1	17.3	16.9	19.1	14.8	14.2	40	31	28
8/29	0.037	0.039	14.5	14.1	13.9	14.2	15.1	11.6	12.1	55	42	52
8/30	0.028	0.026	7.5	5.9	5.4	3.3	6.5	3.6	4.8	18	11	9
8/31	0.032	0.034	4.2	5.8	2.5	2.4	4.7	1.8	3.2	12	8	5
AVG	0.047	0.049	23.31	29.4	26.1	25.5	30.2	27.9	26.2	48	41.8	37.6
MAX	0.066	0.063	210.2	271.6	238.4	239.7	299.0	263.9	317.7	262	281	211

Air Quality Index (AQI)														
Date	Ozone		PM <sub>2.5</sub>							PM <sub>10</sub>			MAXIMUM	
	Ozone - Turnbull NWR	Ozone - Greenbluff	PM2.5 - Airway Heights, 12th & Lawson	PM2.5 - Colbert, E Greenbluff Rd	PM2.5 - Spokane - Augusta & Fiske	PM2.5 - Spokane Valley, Broadway & Glenn	PM2.5 - Spokane, Monroe & Wellesley	PM2.5 - Turnbull NWR (temporary sensor)	PM2.5 - Greenbluff (temporary sensor)	PM10 - Spokane, Augusta & Fiske	PM10 - Spokane Valley, Broadway & Glenn	PM10 - Turnbull NWR		
8/1	47	59	24	31	35	30	39	19	13	36	21	17	59	
8/2	57	77	23	35	34	34	30	15	13	41	24	19	77	
8/3	48	66	31	31	39	47	37	15	11	44	31	21	66	
8/4	44	54	33	36	40	45	32	19	12	46	38	34	54	
8/5	43	44	32	51	38	53	38	21	29	27	26	19	53	
8/6	45	48	55	64	57	62	59	43	43	22	21	18	64	
8/7	45	59	47	54	51	52	53	46	35	22	20	16	59	
8/8	53	59	34	49	37	40	44	38	30	19	15	14	59	
8/9	41	42	14	23	23	22	28	15	13	20	17	10	42	
8/10	39	41	0	10	3	8	13	3	2	15	9	8	41	
8/11	39	43	4	9	15	16	16	4	4	24	16	10	43	
8/12	43	46	7	19	22	19	22	9	6	22	15	13	46	
8/13	39		13	21	26	26	29	18	8	20	15	66	66	
8/14	41	40	29	38	37	36	42	24	17	32	22	19	42	
8/15	43	45	35	38	47	43	49		18	37	26	22	49	
8/16	47	49	62	60	59	60	58			44	34	36	62	
8/17	47	58	74	65	67	70	74		56	53	47	40	74	
8/18	44	54	84	99	92	113	91		92	63	61	46	113	
8/19	88	75	260	322	288	289	349	314	368	154	164	129	368	
8/20	46	47	209	264	221	214	253	293	223	112	117	118	293	
8/21	41	40	130	156	152	103	154	101		62	51	41	156	
8/22	31	29	79	85	77	77	85	87		27	30	24	87	
8/23	39	40	40	48	40	38	48	36		16	16	12	48	
8/24	48	40	43	39	43	32	45	31	32	22	19	14	48	
8/25	40	39	51	58	52	53	57	49	53	30	26	19	58	
8/26	47	46	60	61	58	55	66	52	61	26	20	17	66	
8/27	0	48	55	61	60	55	64	56	56	28	21	23	64	
8/28	68	50	56	62	62	61	66	57	55	37	29	26	68	
8/29	34	36	56	55	55	55	57	48	51	39	48	57		
8/30	26	24	31	25	23	14	27	15	20	17	10	9	31	
8/31	30	31	18	24	10	10	20	8	13	11	7	5	31	
AVG	44	48	56	66	62	61	67	55	51	39	33	30	51	
MAX	88	77	260	322	288	289	349	314	368	154	164	129	368	