Verification of Continued Attainment in Limited Maintenance Areas (2019)

Executive Summary

This document summarizes the calculations for verification of continued attainment of National Ambient Air Quality Standards (NAAQS) in Washington's Limited Maintenance Areas.

Maintenance Areas

Washington has ten maintenance areas for criteria pollutants. Maintenance areas demonstrate continued attainment of the NAAQS either through monitoring or through EPA-approved alternate methods. These methods are summarized in Table 1.

Table 1. Washington maintenance areas and methods of demonstrating NAAQS attainment

Maintenance Area (Pollutant)	End of Maintenance Period	NAAQS Attainment Method
Seattle (PM_{10})	5/14/2021	Estimated PM_{10} from Seattle-Duwamish $PM_{2.5}$ (530330057)
Kent (PM_{10})	5/14/2021	Estimated PM_{10} from Kent-Central & James $PM_{2.5}$ (530332004)
Tacoma (PM_{10})	5/14/2021	Estimated PM_{10} from Tacoma-Alexander nephelometer $PM_{2.5}$ (530530031)
Thurston County (PM_{10})	12/4/2020	Estimated PM_{10} from Lacey-College St nephelometer $PM_{2.5}$ (530670013)
Wallula (PM_{10})	9/26/2025	Kennewick-Metaline PM_{10} monitor (530050002) until 2017; Burbank-Maple St PM_{10} monitor (530710006) as of January 1, 2018
Spokane (PM_{10})	8/30/2025	Spokane-Augusta PM_{10} monitor (530630021)
Yakima (PM_{10})	3/10/2025	Yakima-4th Ave S PM_{10} monitor (530770009)
Tacoma ($PM_{2.5}$)	3/12/2035	Tacoma-L St $PM_{2.5}$ monitor (530530029)
Yakima (CO)	12/31/2022	Modeled CO vehicle emissions
Spokane (CO)	8/30/2025	Modeled onroad, nonroad and residential wood combustion CO emissions

Thurston County PM_{10} Maintenance Area

As detailed in the 2nd PM_{10} Maintenance Plan for Thurston County Washington, ORCAA submitted the design value estimates for the Lacey-College Street nephelometer site (530670013). The 5-year PM_{10} design value estimate for 2014-2018 was 62 µg/m^3. The PM_{10} design value estimate for 2016-2018 was 74 µg/m^3.

Though these values are below the Limited Maintenance Plan (LMP) threshold of 98 µg/m^3 as specified in the Maintenance Plan, they included the wildfire smoke impacts during the summers of 2017 and 2018. For the 2014-2018 time period, the top ten maximum NPM$_{10}$ values were from August 2017 and August 2018.

What follows is a brief description of the calculations for those design values. Ecology provided the daily 24-hour averages for the timeframe in question. The number of daily averages for the period was determined. The 5-year design value estimate was determined based on 1751 values and the 3-year design value estimate was based on 1072 values. The number of values was then compared to Table 6-1 contained in the PM$_{10}$ SIP Development Guidance document. For 1751 values, the Table prescribes using the sixth highest value in the data set. For 1072 values, the Table prescribes the fourth highest value in the data set.

Kent, Seattle and Tacoma PM$_{10}$ Maintenance Areas

Three and five year design values were calculated using the table look up method and the statistical fit method outlined in the LMP guidance document and The Kent, Seattle, and Tacoma PM$_{10}$ Limited Maintenance Plan. A 3-year PM$_{10}$ design value of 150 µg/m^3 or below demonstrates continued compliance with the PM$_{10}$ NAAQS. A 5-year design value below 98 µg/m^3 is required to qualify for the LMP approach. Design values calculated using the table look up method fall within the range of uncertainty of the statistical fit method. Because they are the most conservative values, only the statistical fit values are presented here.

The PM$_{2.5}$ FEM TEOM at Kent-Central & James (530332004) is used to assure continued compliance with the PM$_{10}$ NAAQS and to confirm continued eligibility for the LMP approach. The 2018 five year design value is 68±16µg/m^3 and the three year design value is 71±15 µg/m^3.

The PM$_{2.5}$ FEM TEOM at Seattle-Duwamish (530330057) is used to assure continued compliance with the PM$_{10}$ NAAQS and to confirm continued eligibility for the LMP approach. The 2018 five year design value is 69±14 µg/m^3 and the three year design value is 74±15 µg/m^3. In 2014, we did not have a complete year of data, based on Appendix B of the PM$_{10}$ SIP Development Guide. The design values for Seattle-Duwamish were calculated using the guidelines for incomplete data outlined in Appendix B, page B-1, of the PM$_{10}$ SIP Development Guide.

The PM$_{2.5}$ nephelometer at Tacoma-Alexander Ave (530530031) is used to assure continued compliance with the PM$_{10}$ NAAQS and to confirm continued eligibility for the LMP approach. The 2018 five year design value is 71±16 µg/m^3 and the three year design value is 73±14 µg/m^3.

Spokane County PM$_{10}$ Maintenance Area

The design values for the Spokane County Maintenance Area are based on FEM PM$_{10}$ monitoring data from the Spokane-Augusta monitoring site (530630021), in Spokane, Washington.

In 2017 and 2018, the western United States and Canada experienced severe wildfire seasons, resulting in significant wildfire smoke impacts that caused:

- Six PM_{10} exceedances on September 4, 5, 6, and 7, 2017, and August 19 and 20, 2018. The exceedances affect the LMP design value and the NAAQS design value.
- Four elevated PM_{10} concentrations, September 8, 2017; August 14, 15, and 23, 2018, that are eligible for exclusion from LMP design value calculations following the guidance in the EPA memorandum "Additional Methods, Determinations, and Analyses to Modify Air Quality Data Beyond Exceptional Events."[1]

Ecology placed informational flags ("i-flags") in EPA's Air Quality System (AQS) database on all hourly PM_{10} concentrations on these ten days. The LMP 5-year design value and NAAQS 3-year design value are shown with and without the ten Ecology i-flagged elevated PM_{10} days. Documentation supporting the exclusion of these values as exceptional events is provided in the "Consolidated 2018 Request for Exceptional Event Informational Flagging Memo" and "Informational Flagging Request for Wildfire Affected PM_{10} and $PM_{2.5}$ Exceedances in 2017" in Appendix A.

LMP Design Value

A 5-year PM_{10} design value below 98 µg/m^3 demonstrates that the Spokane County Maintenance Area continues to qualify for the LMP approach.

Table 2. Spokane County Maintenance Area LMP Design Values

	2014-2018 LMP Design Value (DV)
DV with i-flagged data	180 µg/m^3
DV without i-flagged data[2]	84 µg/m^3

NAAQS Design Value

A 3-year PM_{10} design value at or below 1.0 expected exceedances demonstrates compliance with the PM_{10} NAAQS. The design value is the expected number of annual 24-hour exceedances of 150 µg/m^3, averaged over 3 years.

Table 3. Spokane County Maintenance Area NAAQS Design Values

	2016-2018 NAAQS Design Value (DV)
DV with i-flagged data	2.0 expected exceedances
DV without i-flagged data	0.0 expected exceedances

The 2017 and 2018 wildfire smoke impacts generated at total of six PM_{10} exceedances. The Spokane County PM_{10} LMP contingency measures in the LMP are for road dust, windblown dust,

[1] *Additional Methods, Determinations, and Analyses to Modify Air Quality Data Beyond Exceptional Events* [Memorandum]. Research Triangle Park, NC: Environmental Protection Agency. Retrieved from https://www.epa.gov/sites/production/files/2019-04/documents/clarification_memo_on_data_modification_methods.pdf.

[2] Six PM_{10} exceedances and four PM_{10} elevated concentrations

and solid fuel burning devices. The contingency measures do not address wildfire air quality impacts; therefore they have not been implemented.

Spokane County CO Maintenance Area

EPA approved an alternate method of verification of attainment of the CO NAAQS and qualification for the limited maintenance plan option under 40 CFR 58.14(C) (Federal Register # 81 FR 45417; July 14, 2016). Under this alternative, EPA considers the limited maintenance plan criteria met and continued verification of attainment of the CO NAAQS if the total of the three predominate CO emission source categories calculated as part of the triennial emissions inventory (onroad mobile, nonroad, and residential wood combustion) remain below the corresponding total of the 2002 emission inventory source categories approved at the time the Spokane-area was redesignated to attainment. SRCAA and Ecology will compare future year 2017, 2020 and 2023 triennial emission analysis results to the baseline 2002.

Verification of Attainment

Total emissions for the 2017 evaluation year were compared to the 2002 attainment year emissions. The 2017 evaluation year was lower than the attainment year; therefore, the Spokane CO maintenance area continues to qualify for the limited maintenance plan option and continued verification of attainment of the CO NAAQS.

Table 4. Spokane CO maintenance area total emissions (tons per year)

	Onroad	Nonroad	Residential Wood Combustion	Total
2002	**48,878**	**23,795**	**7,199**	**80,872**
2015	**18,678**	**12,586**	**8,260**	**39,524**

SRCAA and Ecology's next analysis will be with the 2020 triennial emissions inventory.

Since publication of the Verification of Continued Attainment in LMAs in 2018, SRCAA has refined its calculation methods for the 2002 baseline emissions at the request of Ecology to match the methods described in the maintenance plan. Previous estimates were based on annual tons for the maintenance area instead of the whole county. In addition, they were taken directly from the 2002 base year inventory and were not re-calculated using the current models and methods. Ecology's detailed description of the correct methods for verification of attainment as reflected in Table 4 is provided below.

Method: The method to verify attainment is described in section 7.3.1 *Alternate Method for Verification of Continued Attainment* of the document *SIP Revision for the Spokane County, Washington Second 10- Year Limited Maintenance Plan for Carbon Monoxide*. Spokane Regional Clean Air Agency, Spokane, Washington. In conjunction with Air Quality Programs, Washington State Department of Ecology, Olympia, Washington. April 2016.

Section 7.3.1 *Alternate Method for Verification of Continued Attainment* is listed below with pertinent text underlined:

> Using the national Triennial Emission Inventory evaluation years and beginning with year 2017, SRCAA and Ecology will compare the Spokane County total of the three major categories of CO emissions (onroad, nonroad and woodstove combustion) with the 2002 emissions. The 2002 emissions were used in the Spokane County attainment plan and first 10-year maintenance plan. The 2002 emissions from the first 10-year maintenance plan correspond to a design value for CO of 5.2 ppm. The 2002 emissions will be:
>
> - Used as the baseline for the alternate method of verification of attainment of the CO NAAQS (9.0 ppm) and verification that the area continues to meet the LMP qualification threshold (7.65 ppm).
> - Recalculated using current emissions estimation models for each comparison. Onroad and nonroad estimates will be prepared using model defaults, as discussed below.
>
> If the inventory (2017, 2020 and 2023) totals are less than or equal to the 2002 CO emissions, then continued attainment and qualification under the LMP option threshold is verified. If future triennial inventories exceed the 2002 CO emissions, then Ecology will reestablish CO monitoring meeting the requirements of 40 C.F.R. Part 58 to enable EPA to determine if the area continues meet the LMP option, to ascertain continued attainment of the CO NAAQS, and to trigger contingency measures if a CO NAAQS violation were to occur.
>
> In order to maintain consistency in comparing 2002 onroad and nonroad emissions inventories to future year emission inventories, Ecology will run the models using the national default setting of a current version of the accepted model. The use of the national default settings will simplify the process and eliminate any bias due to changes in the method of gathering local input data. While the values obtained will differ from those in the Triennial Emission Inventory, their trend will be the same and proportional.
>
> A general requirement for LMP areas is that the State determine that the criteria used to qualify for the LMP option will continue to be met. As discussed above, SRCAA and Ecology will compare future year 2017, 2020 and 2023 triennial emissions analysis results to the baseline 2002 CO emissions as part of the alternate method for verification of continued attainment and continued eligibility for the LMP option. Ecology will submit this information to EPA as part of the monitoring network report submitted to the EPA annually pursuant to 40 CFR part 58. The annual network monitoring report will also be available to the public for the duration of the 10 year period at:
> https://fortress.wa.gov/ecy/publications/UIPages/Home.aspx

To satisfy the verification process, annual emissions from onroad sources, nonroad sources, and residential wood combustion were estimated for Spokane County using the latest tools and assumptions for 2002 (attainment year), 2017, 2020, 2023, and 2026. The emissions calculations are described below.

Residential Wood Combustion (RWC)

The 2014 National Emissions Inventory, version 2, was used as the basis for the RWC emissions estimates. (Estimates for 2017 are not completed). Most of the RWC estimates in the NEI were provided by Ecology based on local survey data, population/housing data, and the most recent emission factors. The 2002 and 2017 estimates were calculated by multiplying 2014 emissions by the ratio of occupied housing units (OHU) in 2002 and 2017 to 2014. Occupied housing units were obtained from OFM's Small Area Estimates Program (SAEP), county file (OFM_saep_county10.xlsx). https://www.ofm.wa.gov/washington-data-research/population-demographics/population- estimates/small-area-estimates-program.

Table 5. Occupied Housing Units, SAEP

Year	OHU	Ratio to 2014
2002	167,254	0.872
2014	191,903	
2017	198,597	1.035

The SAEP does not include projections. Emissions calculated for 2017 were projected to 2020, 2023, and 2026 based on population growth rates calculated from Growth Management Act population estimates for 2017 and the future years (https://www.ofm.wa.gov/washington-data-research/population- demographics/population-forecasts-and-projections/growth-management-act-county-projections).

There are low, medium, and high population projections estimates. The medium projection was used to estimate the growth factors. The 2020, 2023, and 2026 estimates were calculated by multiplying 2017 emissions by the growth factors.

Table 6. April 1 Population (2002, 2017), GMA 2017 medium series estimates (2017, 2020, 2023, 2026)

Year	Population	Growth from 2017
2017	499,800	
2020	516,807	1.034
2023	531,271	1.063
2026	545,194	1.091

Onroad

MOVES2014b with database movesdb20180517 was used to estimate emissions for all years with the settings below.

MOVES Panel Settings:

- Scale: National (Defaults)
- Time Spans
    - Years: 2002, 2017, 2020, 2023, 2026
    - Month: All months
    - Days: Weekdays and weekend days
    - Hours: All hours
- Geographic Bounds: Spokane County
- Vehicles/Equipment: All vehicles
- Road Type: All road types
- Pollutants and Processes: All CO processes
- Manage Input Data Sets: Washington's California Standards adoption
- Output: T/yr

Nonroad

Nonroad includes only the sources estimated using the MOVES model. It does not include locomotives and aircraft. Combined, locomotives and aircraft were less than 2% of the total annual maintenance plan inventory.

MOVES2014b with database movesdb20180517 was used to estimate emissions for all years with the settings below.
MOVES Panel Settings:

- Scale: Nonroad (National is the only choice)
- Time Spans
    - Years: 2002, 2017, 2020, 2023, 2026
    - Month: All months
    - Days: Weekday and weekend days
- Geographic Bounds: Spokane County
- Vehicles/Equipment: All vehicles/equipment
- Road Type: Nonroad (no choices)
- Pollutants and Processes: All CO processes (running exhaust is the only process)
- Output: T/yr

Verification of Attainment

Total emissions for each evaluation year were compared to the 2002 attainment year emissions. All the evaluation years were lower than the attainment year; therefore, attainment is verified.

Table 7. Spokane County CO Emissions in Tons per Year

Year	Onroad	Nonroad	RWC	Total
2002	49,878	23,795	7,199	80,872
2017	18,678	12,586	8,260	39,524
2020	15,408	12,904	8,548	36,859

Year	Onroad	Nonroad	RWC	Total
2023	13,035	13,342	8,839	35,216
2026	11,059	13,869	9,086	34,014

Appendix. Maintenance Plan Correspondence from Local Air Agencies.

To: Jill Schutle, Ecology

From: Robert Moody, ORCAA

Re: PM10 Design Values for Lacey, Washington 2014-2018

Date: January 17, 2019

As detailed in the 2nd PM_{10} Maintenance Plan for Thurston County Washington, ORCAA wishes to submit the design value estimates for the Lacey-College Street nephelometer site (53670013). The 5-year PM_{10} design value estimate for 2014-2018 was 62 $\mu g/m^3$. The PM_{10} design value estimate for 2016-2018 was 74 $\mu g/m^3$.

Though these values are below the Limited Maintenance Plan threshold of 98 $\mu g/m^3$ as specified in the Maintenance Plan, they included the wildfire smoke impacts during the summers of 2017 and 2018. For the 2014-2018 time period, the top ten maximum NPM10 values were from August 2017 and August 2018.

What follows is a brief description of the calculations for those design values.
Ecology provided the daily 24-hour averages for the timeframe in question. The number of daily averages for the period was determined. The 5-year design value estimate was determined based on 1751 values and the 3-year design value estimate was based on 1072 values. The number of values was then compared to Table 6-1 contained in the PM10 SIP Development Guidance document. For 1751 values, the Table prescribes using the sixth highest value in the data set. For 1072 values, the Table prescribes the fourth highest value in the data set.

pscleanair.org
Puget Sound Clean Air Agency

MEMO

Date: March 26, 2019

To: Jill Schulte

CC:

From: Sara Conley

Subject: Design Values for Kent, Seattle, and Tacoma PM10 Maintenance Areas

Dear Jill Schulte,

Included in this memo are the five year and three year design values for the Kent, Seattle, and Tacoma PM10 Maintenance Areas. Three and five year design values were calculated using the table look up method and the statistical fit method outlined in the LMP guidance document and The Kent, Seattle, and Tacoma PM10 Limited Maintenance Plan. A 3-year PM_{10} design value of 150 $\mu g/m^3$ or below demonstrates continued compliance with the PM_{10} NAAQS. A 5-year design value below 98 $\mu g/m^3$ is required to qualify for the LMP approach. Design values calculated using the table look up method fall within the range of uncertainty of the statistical fit method. Because they are the most conservative values, only the statistical fit values are presented here.

The PM2.5 FEM TEOM at James St and Central Ave (530332004) is used to assure continued compliance with the PM10 NAAQS and to confirm continued eligibility for the Limited Maintenance Plan approach. The 2018 five year design value is 68±16$\mu g/m^3$ and the three year design value is 71±15 $\mu g/m^3$.

The PM2.5 FEM TEOM at Seattle-Duwamish (530330057) is used to assure continued compliance with the PM10 NAAQS and to confirm continued eligibility for the Limited Maintenance Plan approach. The 2018 five year design value is 69±14 $\mu g/m^3$ and the three year design value is 74±15 $\mu g/m^3$. In 2014 we did not have a complete year of data, based on Appendix B of the PM10 SIP Development Guide. The design values for Seattle-Duwamish were calculated using the guidelines for incomplete data outlined in Appendix B, page B-1, of the PM10 SIP Development Guide.

The PM2.5 Nephelometer at Tacoma – Alexander Ave (530530031) is used to assure continued compliance with the PM10 NAAQS and to confirm continued eligibility for the Limited Maintenance Plan approach. The 2018 five year design value is 71±16 $\mu g/m^3$ and the three year design value is 73±14 $\mu g/m^3$.

Please let me know if you have any questions.

Best wishes,

Sara Conley

PM10DesignValues2018.docx

Date: April 17, 2019

To: Jill Schulte, Beth Friedman, Sean Lundblad

CC: Laurie Hulse-Moyer, Jacob Berkley, Julie Oliver, Mark Rowe

From: Margee Chambers

Subject: Spokane County PM_{10} and CO Design Values for Air Monitoring Network Report

PM_{10} Design Values

Included in this memo are the 5-year and 3-year design values for the Spokane County Maintenance Area, in Spokane, Washington. The design values are based on FRM and FEM 24-hour PM_{10} monitoring data from the Augusta Avenue site (530630021), in Spokane, Washington.

The limited maintenance plan (LMP) critical design value is shown with and without the six Ecology i-flagged PM_{10} exceedance data and four PM_{10} high concentration data. The National Ambient Air Quality Standard (NAAQS) design value is shown with and without the six Ecology i-flagged PM_{10} exceedance data.

In 2017 and 2018, the western United States and Canada experienced severe wildfire seasons, resulting in significant wildfire smoke impacts that caused:

- Six PM_{10} exceedances on September 4, 5, 6, and 7, 2017, and August 19 and 20, 2018. The exceedances affect the LMP design value and the NAAQS design value.
- Four PM_{10} elevated concentrations, September 8, 2017; August 14, 15, and 23, 2018, that is eligible for exclusion. The elevated concentrations have regulatory significance for the area to meet the LMP design value.
- Two PM_{10} elevated concentrations, August 13 and 16, 2018, were flagged but not eligible for exclusion.

LMP Critical Design Value:

A 5-year PM10 critical design value below 98 $\mu g/m^3$ demonstrates that the Spokane County Maintenance Area continues to qualify for the LMP approach.

	2014-2018 LMP Design Value (DV)
DV with i-flagged data	180 $\mu g/m^3$
DV without i-flagged data[1]	84 $\mu g/m^3$

[1] Six PM10 exceedances and four PM_{10} elevated concentrations

NAAQS Design Value:

A 3-year PM_{10} design value at or below 1.0 demonstrates compliance with the PM_{10} NAAQS. The design value is the number of 24-hour exceedances of 150 $\mu g/m^3$, averaged over three years.

	2016-2018 NAAQS Design Value (DV)
DV with i-flagged data	2.0
DV without i-flagged data	0.0

The 2017 and 2018 wildfire smoke impacts generated at total of six PM_{10} exceedances. The Spokane County PM_{10} LMP contingency measures in the LMP are for road dust, windblown dust, and solid fuel burning devices. The contingency measures do not address wildfire air quality impacts; therefore they have not been implemented. SRCAA and Ecology are discussing possible exceptional events demonstrations to remove the i-flagged 2017 and 2018 data when determining compliance with NAAQS and the limited maintenance plan approach.

CO Design Value

EPA approved an alternate method of verification of attainment of the CO NAAQS and qualification for the limited maintenance plan option under 40 CFR 58.14(C) (Federal Register # 81 FR 45417; July 14, 2016). Under this alternative, EPA considers the limited maintenance plan criteria met and continued verification of attainment of the CO NAAQS if the total of the three predominate CO emission source categories calculated as part of the triennial emissions inventory (onroad mobile, nonroad, and residential wood combustion) remain below the corresponding total of the 2002 emission inventory source categories approved at the time the Spokane-area was redesignated to attainment. SRCAA and Ecology will compare future year 2017, 2020 and 2023 triennial emission analysis results to the baseline 2002.

Verification of Attainment:

Total emissions for the 2017 evaluation year were compared to the 2002 attainment year emissions. The 2017 evaluation year was lower than the attainment year; therefore, the Spokane CO maintenance area continues to qualify for the limited maintenance plan option and continued verification of attainment of the CO NAAQS.

Spokane County CO Emissions in Tons per Year

Year	Onroad	Nonroad	Residential Wood Combustion	Total
2002	49,878 tons/yr	23,795 tons/yr	7,199 tons/yr	80,872 tons/yr
2017	18,678 tons/yr	12,586 tons/yr	8,260 tons/yr	39,524 tons/yr

SRCAA and Ecology's next analysis will be with the 2020 triennial emissions inventory.

Attached: Spokane 2019 CO verification documentation

Spokane 2nd-year CO Maintenance Plan Verification of Attainment

Method: The method to verify attainment is described in section 7.3.1 *Alternate Method for Verification of Continued Attainment* of the document *SIP Revision for the Spokane County, Washington Second 10-Year Limited Maintenance Plan for Carbon Monoxide*. Spokane Regional Clean Air Agency, Spokane, Washington. In conjunction with Air Quality Programs, Washington State Department of Ecology, Olympia, Washington. April 2016.

http://partnerweb/sites/AQ/sipshome/maintenanceplans/Spokane%20CO%20and%20PM10%202nd%2010Year%20Maintenance%20Plans/CO%202nd%2010-year%20LMP%20Final%204.25.16.pdf

Section 7.3.1 *Alternate Method for Verification of Continued Attainment* is listed below with pertinent text underlined:

> Using the national Triennial Emission Inventory evaluation years and beginning with year 2017, SRCAA and Ecology will compare the Spokane County total of the three major categories of CO emissions (onroad, nonroad and woodstove combustion) with the 2002 emissions. The 2002 emissions were used in the Spokane County attainment plan and first 10-year maintenance plan. The 2002 emissions from the first 10-year maintenance plan correspond to a design value for CO of 5.2 ppm. The 2002 emissions will be:
>
> - Used as the baseline for the alternate method of verification of attainment of the CO NAAQS (9.0 ppm) and verification that the area continues to meet the LMP qualification threshold (7.65 ppm).
> - Recalculated using current emissions estimation models for each comparison. Onroad and nonroad estimates will be prepared using model defaults, as discussed below.
>
> If the inventory (2017, 2020 and 2023) totals are less than or equal to the 2002 CO emissions, then continued attainment and qualification under the LMP option threshold is verified. If future triennial inventories exceed the 2002 CO emissions, then Ecology will reestablish CO monitoring meeting the requirements of 40 C.F.R. Part 58 to enable EPA to determine if the area continues meet the LMP option, to ascertain continued attainment of the CO NAAQS, and to trigger contingency measures if a CO NAAQS violation were to occur.
>
> In order to maintain consistency in comparing 2002 onroad and nonroad emissions inventories to future year emission inventories, Ecology will run the models using the national default setting of a current version of the accepted model. The use of the national default settings will simplify the process and eliminate any bias due to changes in the method of gathering local input data. While the values obtained will differ from those in the Triennial Emission Inventory, their trend will be the same and proportional.
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> A general requirement for LMP areas is that the State determine that the criteria used to qualify for the LMP option will continue to be met. As discussed above, SRCAA and

Ecology will compare future year 2017, 2020 and 2023 triennial emissions analysis results to the baseline 2002 CO emissions as part of the alternate method for verification of continued attainment and continued eligibility for the LMP option. Ecology will submit this information to EPA as part of the monitoring network report submitted to the EPA annually pursuant to 40 CFR part 58. The annual network monitoring report will also be available to the public for the duration of the 10 year period at: https://fortress.wa.gov/ecy/publications/UIPages/Home.aspx

To satisfy the verification process, annual emissions from onroad sources, nonroad sources, and residential wood combustion were estimated for Spokane County using the latest tools and assumptions for 2002 (attainment year), 2017, 2020, 2023, and 2026. The emissions calculations are described below.

Residential Wood Combustion (RWC)

The 2014 National Emissions Inventory, version 2, was used as the basis for the RWC emissions estimates. (Estimates for 2017 are not completed). Most of the RWC estimates in the NEI were provided by Ecology based on local survey data, population/housing data, and the most recent emission factors. The 2002 and 2017 estimates were calculated by multiplying 2014 emissions by the ratio of occupied housing units (OHU) in 2002 and 2017 to 2014. Occupied housing units were obtained from OFM's Small Area Estimates Program (SAEP), county file (OFM_saep_county10.xlsx). https://www.ofm.wa.gov/washington-data-research/population-demographics/population-estimates/small-area-estimates-program.

Occupied Housing Units, SAEP

year	OHU	Ratio to 2014
2002	167,254	0.872
2014	191,903	
2017	198,597	1.035

The SAEP does not include projections. Emissions calculated for 2017 were projected to 2020, 2023, and 2026 based on population growth rates calculated from Growth Management Act population estimates for 2017 and the future years (https://www.ofm.wa.gov/washington-data-research/population-demographics/population-forecasts-and-projections/growth-management-act-county-projections). There are low, medium, and high population projections estimates. The medium projection was used to estimate the growth factors. The 2020, 2023, and 2026 estimates were calculated by multiplying 2017 emissions by the growth factors.

April 1 Population (2002, 2017), GMA 2017 medium series estimates (2017, 2020, 2023, 2026)

Year	Population	Growth from 2017
2017	499,800	
2020	516,807	1.034
2023	531,271	1.063
2026	545,194	1.091

Onroad

MOVES2014b with database movesdb20180517 was used to estimate emissions for all years with the settings below.

MOVES Panel Settings:

- Scale: National (Defaults)
- Time Spans
  - Years: 2002, 2017, 2020, 2023, 2026
  - Month: All months
  - Days: Weekdays and weekend days
  - Hours: All hours
- Geographic Bounds: Spokane County
- Vehicles/Equipment: All vehicles
- Road Type: All road types
- Pollutants and Processes: All CO processes
- Manage Input Data Sets: Washington's California Standards adoption
- Output: T/yr

Nonroad

Nonroad includes only the sources estimated using the MOVES model. It does not include locomotives and aircraft. Combined, locomotives and aircraft were less than 2% of the total annual maintenance plan inventory.

MOVES2014b with database movesdb20180517 was used to estimate emissions for all years with the settings below.

MOVES Panel Settings:

- Scale: Nonroad (National is the only choice)
- Time Spans
  - Years: 2002, 2017, 2020, 2023, 2026
  - Month: All months
  - Days: Weekday and weekend days
- Geographic Bounds: Spokane County
- Vehicles/Equipment: All vehicles/equipment
- Road Type: Nonroad (no choices)
- Pollutants and Processes: All CO processes (running exhaust is the only process)
- Output: T/yr

Verification of Attainment

Total emissions for each evaluation year were compared to the 2002 attainment year emissions. All the evaluation years were lower than the attainment year; therefore, attainment is verified.

Spokane County CO Emissions in Tons per Year

Year	Onroad	Nonroad	RWC	Total
2002	49,878	23,795	7,199	80,872
2017	18,678	12,586	8,260	39,524
2020	15,408	12,904	8,548	36,859
2023	13,035	13,342	8,839	35,216
2026	11,059	13,869	9,086	34,014

Accommodation Requests: To request ADA accommodation including materials in a format for the visually impaired, call Ecology at 360-407-6800 or visit https://ecology.wa.gov/accessibility. People with impaired hearing may call Washington Relay Service at 711. People with speech disability may call TTY at 877-833-6341

DEPARTMENT OF ECOLOGY
Air Quality Program
Flagging Memo

Feburary 7, 2018

TO: Sean Lundblad, SWRO & Air Quality Operations Unit Supervisor
FROM: Caroline (Ying) Sun, Air Quality Planner
CC: Ecology: Nancy Pritchett, Jason Alberich, Laurie Hulse-Moyer, Farren Herron-Thorpe, Jill Schulte, and Melanie Forster
Benton: Robin Priddy
Puget Sound: Kathy Strange
Yakima: Keith Hurley and Hasan Tahat
Spokane: Julie Oliver and Margee Chambers
SUBJECT: Informational Flagging Request for Wildfire Affected PM10 and PM2.5 Exceedances in 2017.

The Exceptional Event Rule (EER) provides a process for excluding qualified exceedances from compliance determinations with the National Ambient Air Quality Standards (NAAQS). Placing a preliminary informational flag on the exceedances in the EPA's Air Quality System (AQS) is the first step in the process.

To meet the EER requirements, Ecology's Air Quality Program Policy and Planning Section requests you to flag the following wildfire affected PM_{10} and $PM_{2.5}$ exceedances in 2017 with an informational flag (i-flag).

Table 1 Wildfire affected exceedances need i-flag

Location	Date	Pollutant	ug/m3
Event 1 Description: Canada British Columbia wildfires			
Qualifier Code: IF; Qualifier Description: Canadian Fires; Qualifier Type: Informational Only			
Darrington-Fir St	8/2/2017	PM2.5	46.8
	8/4/2017	PM2.5	42.3
	8/7/2017	PM2.5	41.5
	8/8/2017	PM2.5	45.6
	8/10/2017	PM2.5	36.7
Ellensburg-Ruby St	8/2/2017	PM2.5	47.8
	8/3/2017	PM2.5	46.1
	8/4/2017	PM2.5	36.7
	8/5/2017	PM2.5	51.9
	8/6/2017	PM2.5	42.3
	8/7/2017	PM2.5	40.6
	8/8/2017	PM2.5	41.1
	8/9/2017	PM2.5	35.5

Location	Date	Pollutant	ug/m3
Yakima-4th Ave	8/2/2017	PM2.5	45.9
	8/3/2017	PM2.5	36.7
	8/5/2017	PM2.5	48.3
	8/6/2017	PM2.5	36.4
	8/8/2017	PM2.5	35.7
Spokane-Augusta Ave	8/4/2017	PM2.5	51.9
	8/5/2017	PM2.5	44.2
	8/6/2017	PM2.5	37.1
	8/7/2017	PM2.5	36.2
	8/9/2017	PM2.5	48.2
	8/10/2017	PM2.5	49.4
	8/11/2017	PM2.5	47.4
Comment: On August 1, 2017, winds carried smoke south into State of Washington (WA) from wildfires in British Columbia (BC), Canada. Moderate smoke impacted WA for many days, but the smoke in Western WA mostly cleared out by August 7, when winds shifted and carried the smoke from BC to the southeast. During this time, eastern WA was still experiencing moderate smoke from BC, and there was also some smoke impact from the Diamond Creek fire in WA (eastern Cascade slopes, near the Canada border). On August 11, a weather ridge built up along the west coast started to move inland and eventually cleared smoke out of the state by August 13.			
Event 2 Description: Northern California, Western Oregon, Washington, Idaho and Montana wildfires			
Qualifier Code: IT; Qualifier Description: Wildfire-US; Qualifier Type: Informational Only			
Kennewick-Metaline	9/5/2017	PM10	261
	9/6/2017	PM10	206
	9/7/2017	PM10	195
Darrington-Fir St	9/5/2017	PM2.5	58.3
	9/6/2017	PM2.5	70.3
	9/7/2017	PM2.5	39.7
Ellensburg-Ruby St	9/3/2017	PM2.5	63.1
	9/4/2017	PM2.5	49.4
	9/5/2017	PM2.5	158.5
	9/6/2017	PM2.5	165.2
	9/7/2017	PM2.5	111.2
Yakima-4th Ave	9/5/2017	PM10	215
	9/6/2017	PM10	206
	9/7/2017	PM10	197
	8/30/2017	PM2.5	44.2
	9/2/2017	PM2.5	52.7
	9/3/2017	PM2.5	84.5
	9/4/2017	PM2.5	83.3
	9/5/2017	PM2.5	184.6
	9/6/2017	PM2.5	173.3
	9/7/2017	PM2.5	166.4
	9/8/2017	PM2.5	75.2
	9/12/2017	PM2.5	39.9
	9/15/2017	PM2.5	41.2
Spokane-Augusta Ave	9/4/2017	PM10	168

Location	Date	Pollutant	ug/m3
	9/5/2017	PM10	223
	9/6/2017	PM10	214
	9/7/2017	PM10	227
	9/4/2017	PM2.5	145.1
	9/5/2017	PM2.5	193
	9/6/2017	PM2.5	186
	9/7/2017	PM2.5	194.9
	9/8/2017	PM2.5	99.7
	9/14/2017	PM2.5	46.2

Comment: On August 30, 2017, southwest winds transported smoke from multiple wildfires in Northern California and Western Oregon into Eastern Washington. The smoke impacted Yakima and resulted in the PM2.5 exceedance on that day.

On September 3, 2017, several fires in Northern California and Western Oregon produced smoke and moderate winds carried that smoke north over Washington state. During this time, there were also several fires in the Cascades (WA) and Rockies (ID and MT) that produced smoke that traveled east. On September 4, winds were light and variable across the Pacific Northwest, allowing smoke to build up in the region for several days. Smoke from Idaho, Montana, California, Oregon, and Washington all contributed to poor air quality. On September 8, winds increased and transported the smoke east, clearing out most of the state.

On September 2, 12, and 15, 2017, west winds transported smoke from local wildfires, Norse Peak Fire and Eagle Creek Fire to Yakima. The smoke impacted Yakima and resulted in the PM2.5 exceedance on those days.

Canada, Montana and Idaho wildfires impacted Spokane on September 14 and caused the PM2.5 exceedance. Due to cloud coverage in the region, satellite images do not show the sources of smoke. AIRPACT's PM2.5 forecast image for 4 pm is shown below to help identify the source of smoke.

Satelite Images

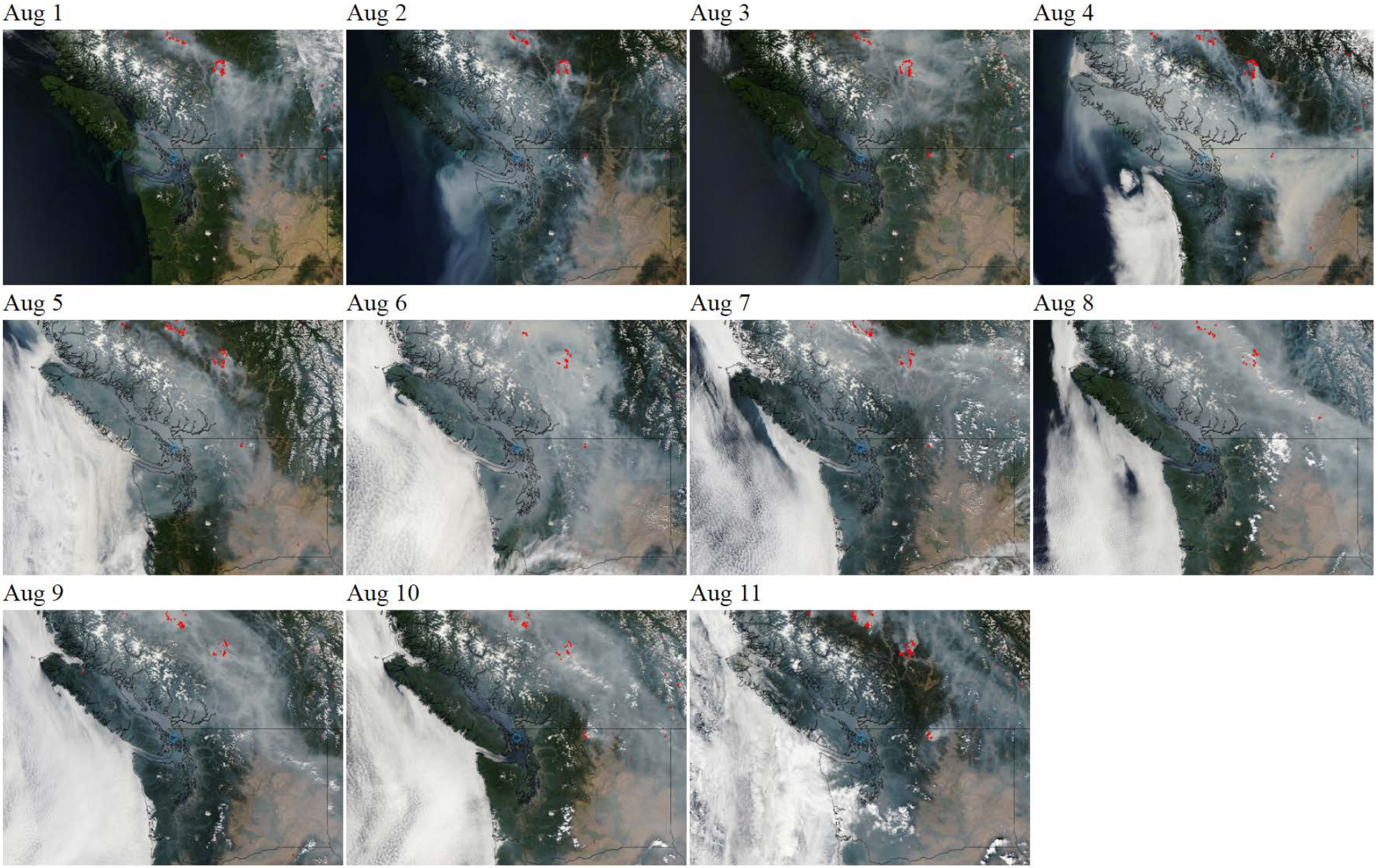

Figure 1 Satellite Images from August 1 to 11, 2017.

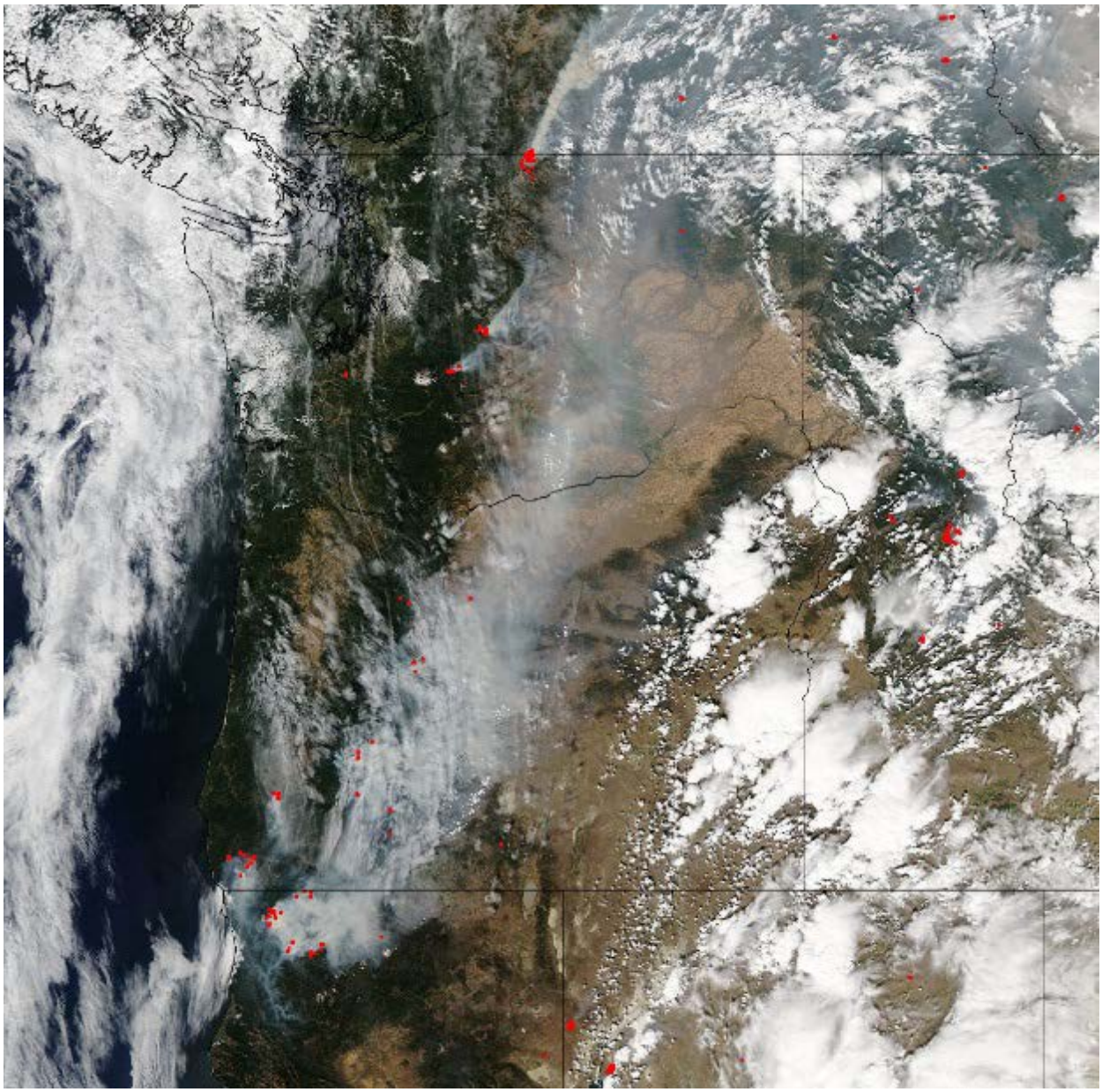

Figure 2 Satellite Image from August 30, 2017

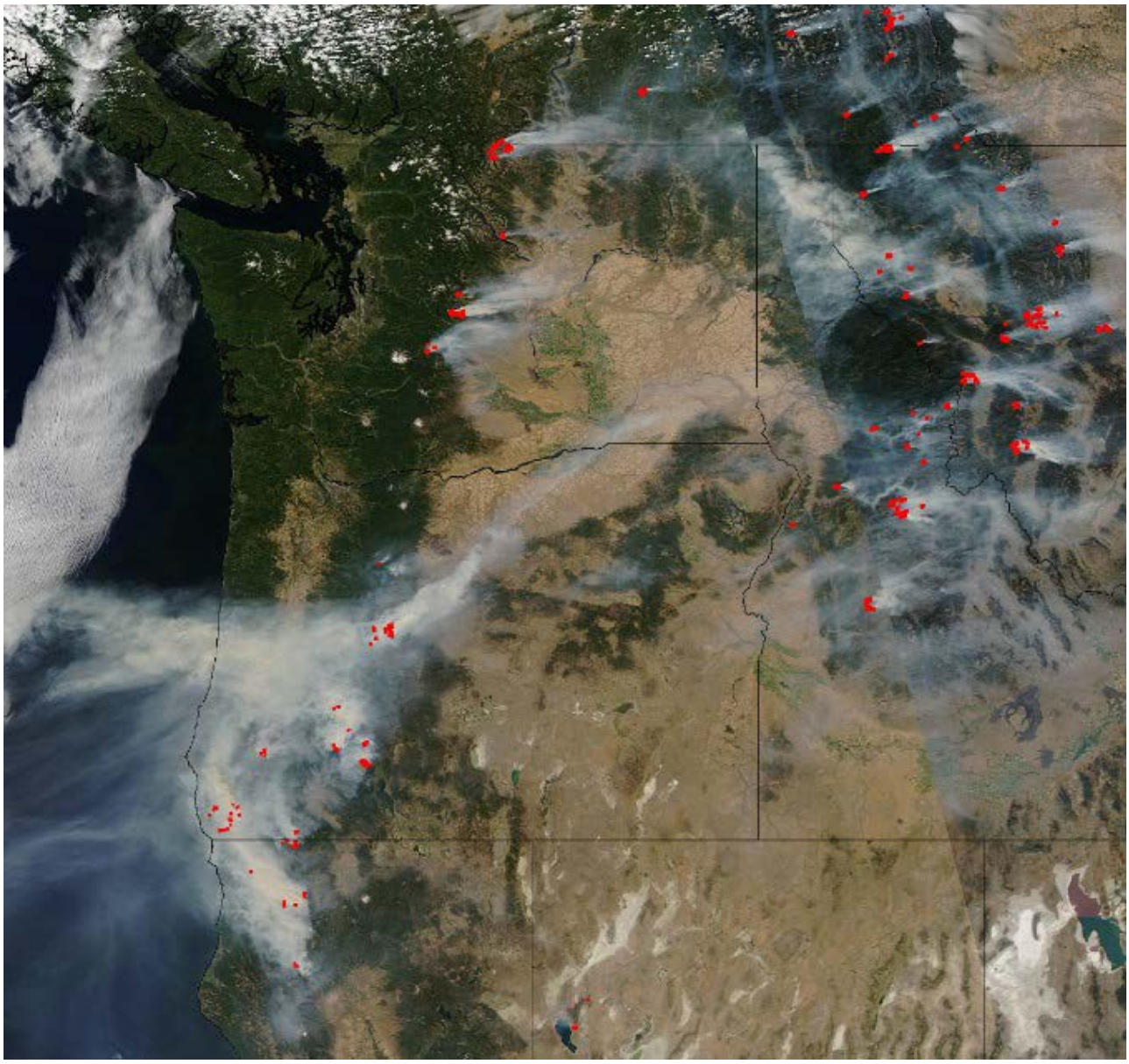

Figure 3 Satellite Image from September 2, 2017

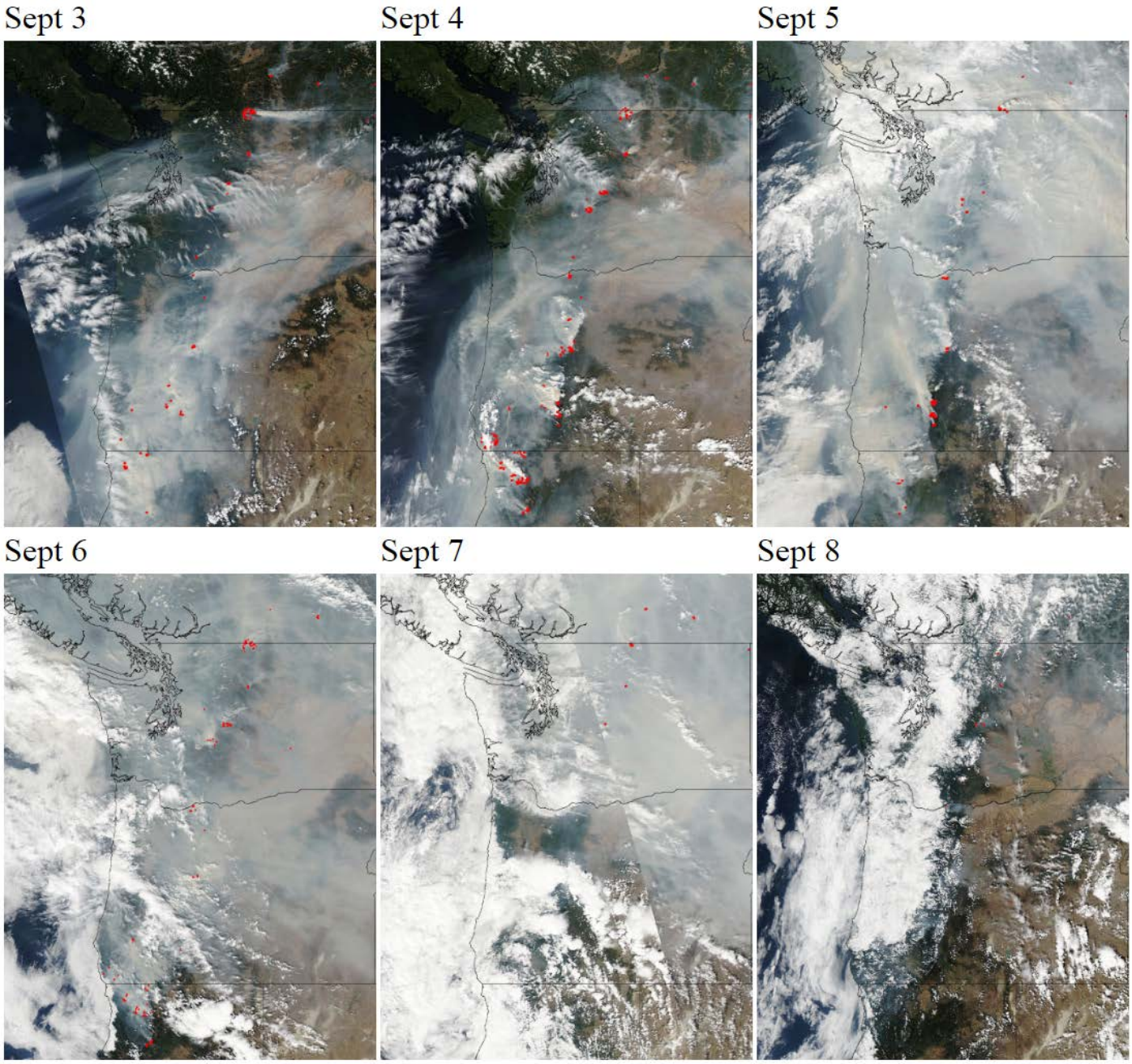

Figure 4 Satellite Images from September 3 to 8, 2017

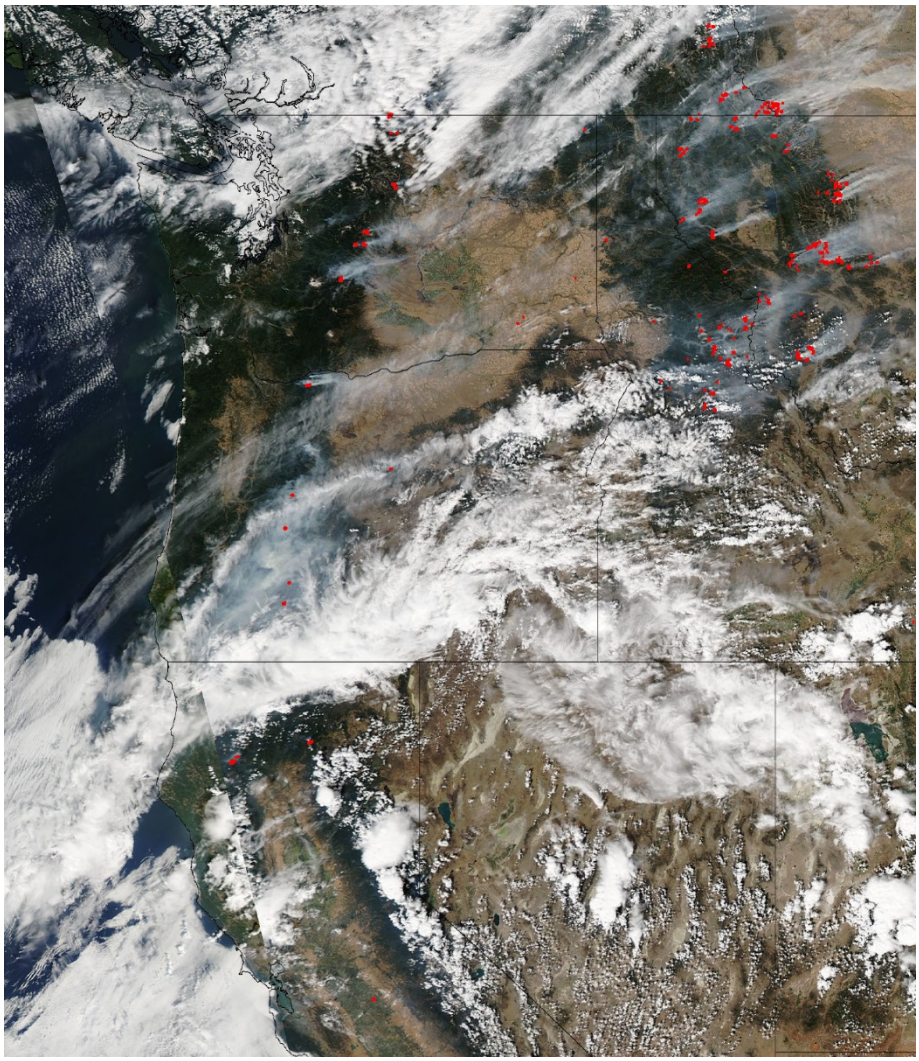

Figure 5 Satellite Image from September 12, 2017

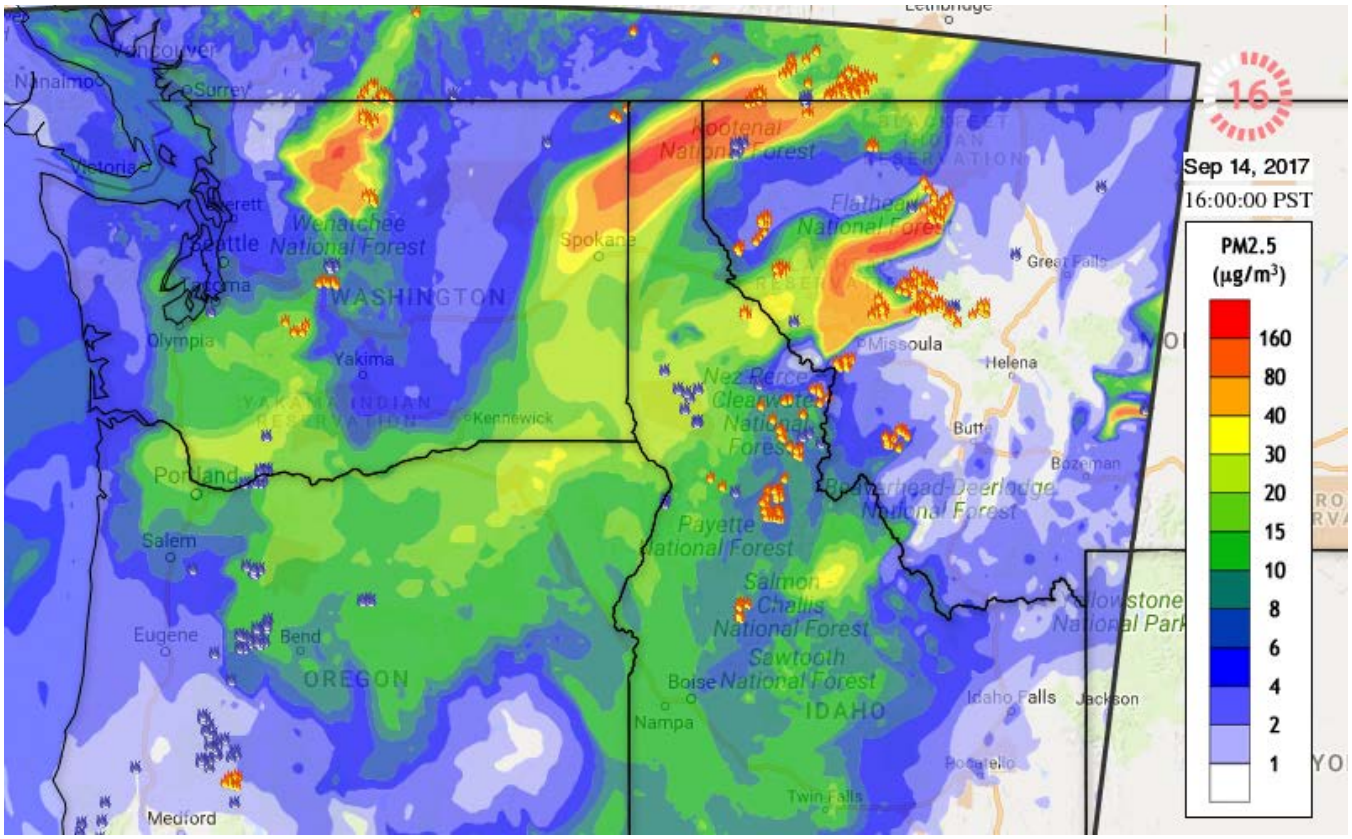

Figure 6 AIRPACT Image for September 14, 2017 (4 p.m.)

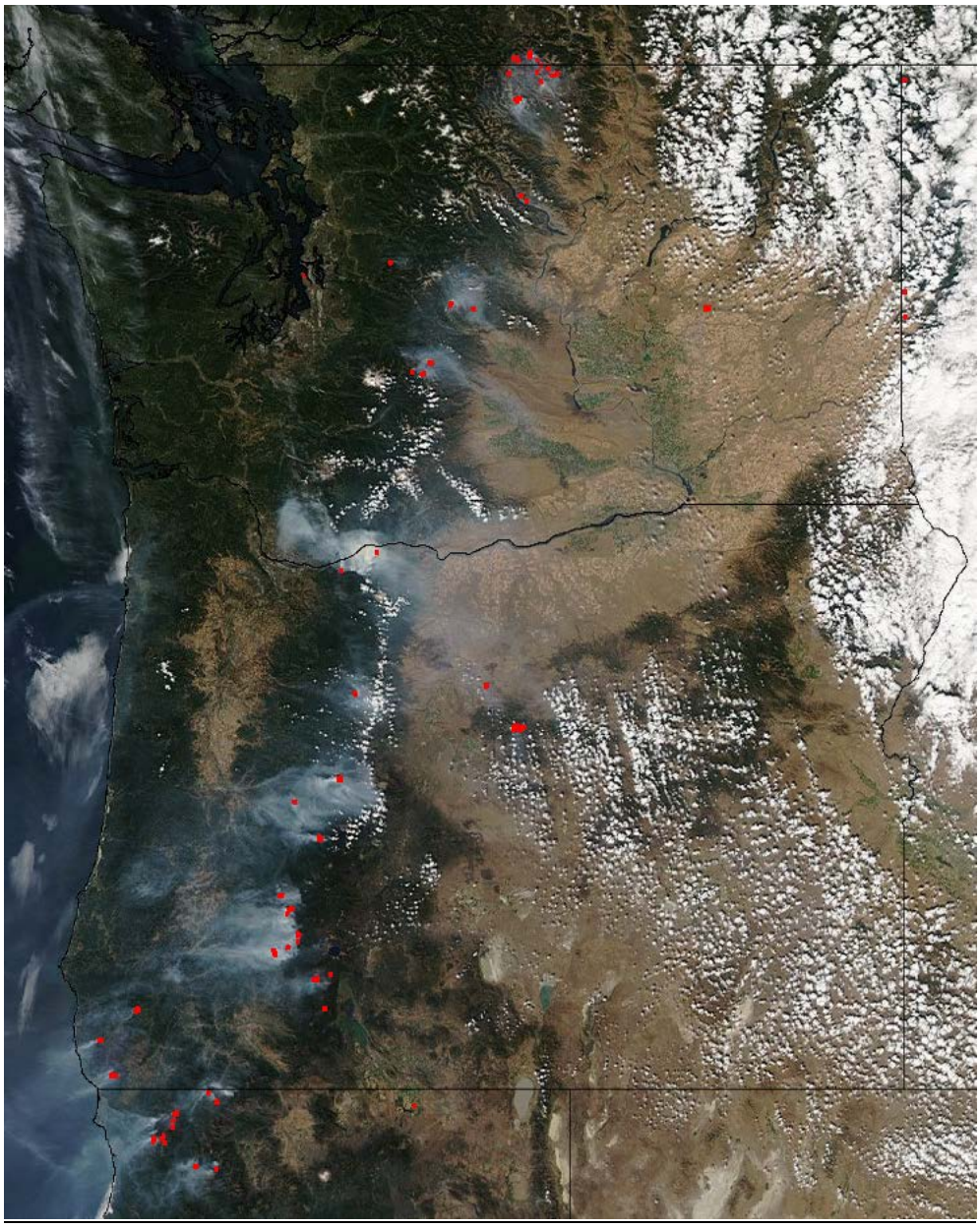

Figure 7 Satellite Image from September 15, 2017

Air Quality Alerts and Washington Smoke Blog

Ecology and Local Clean Air Agencies issued Air Quality Alerts nearly every day during both August and September 2017 wildfire episodes. National Weather Service relayed these Air Quality Alerts through their distribution system. We list two of the Air Quality Alerts below as examples.

Your Severe Weather Watches and Warnings

KENNEWICK, WA

Your Radar | Current Conditions | 15-Day Forecast

AIR QUALITY ALERT MESSAGE
Oregon Department of Environmental Quality
RELAYED BY NATIONAL WEATHER SERVICE PENDLETON OR
1000 AM PDT Thu Aug 3 2017
...AIR QUALITY ALERT IN EFFECT UNTIL NOON PDT SATURDAY...

The Washington State Department of Ecology has issued an Air Quality Alert, in effect until noon PDT Saturday for the following counties:

Kittitas
Yakima
Klickitat
Benton
Franklin
Walla Walla
Columbia

A Smoke Air Quality Alert has been issued. Smoke from wildfires in eastern Washington, British Columbia, and Montana is expected to affect central and southern Washington as north to northeast winds push smoke around the area during the remainder of the week. Air quality will vary between good and unhealthy depending on wind direction and time of day.

Pollutants in smoke can cause burning eyes, runny nose, aggravate heart and lung diseases, and aggravate other serious health problems. Children, the elderly, and individuals with respiratory illnesses are most at risk of serious health effects. If you experience respiratory distress, you should speak with your physician. Limit outdoor activities and keep children indoors if it is smoky. Please follow medical advice if you have a heart or lung condition.

Information about air quality is on the Washington Department of Ecology Web site at http://www.ecy.wa.gov/air.html or call 360-407-6000.

Your Severe Weather Watches and Warnings

Kennewick, WA

Your Radar | Current Conditions | 15-Day Forecast

AIR QUALITY ALERT MESSAGE
Washington State Department of Ecology
RELAYED BY NATIONAL WEATHER SERVICE PENDLETON OR
1131 AM PDT Sun Sep 3 2017
...AIR QUALITY ALERT IN EFFECT UNTIL NOON PDT WEDNESDAY...

The Washington State Department of Ecology has issued an Air Quality Alert...in effect until noon PDT Wednesday.

A Smoke Air Quality Alert remains in effect. Wildfires burning in the region combined with forecast conditions will cause air quality to reach unhealthy levels.

Pollutants in smoke can cause burning eyes...runny nose...aggravate heart and lung diseases...and aggravate other serious health problems. Limit outdoor activities. Please follow medical advice if you have a heart or lung condition.

Information about air quality is on the Washington Department of Ecology Web site at http://www.ecy.wa.gov/air.html or call 360-407-

6000.

Ecology also posted wildfire smoke forecast, smoke updates and their air quality impacts on the Washington Smoke Blog throughout the 2017 fire season. All the postings are available at http://wasmoke.blogspot.com/.

Media Reports

Due to the large impact of the wildfires, there were wildfire media reports that covered almost the entire State of Washington through August and September in 2017. We are including four the media reports below as examples in this flagging memo.

Sign In Register

seattlepi

B.C. fire smoke: Is Seattle's air worse than China's?

By Daniel DeMay, SeattlePI Updated 6:02 pm, Thursday, August 3, 2017

13

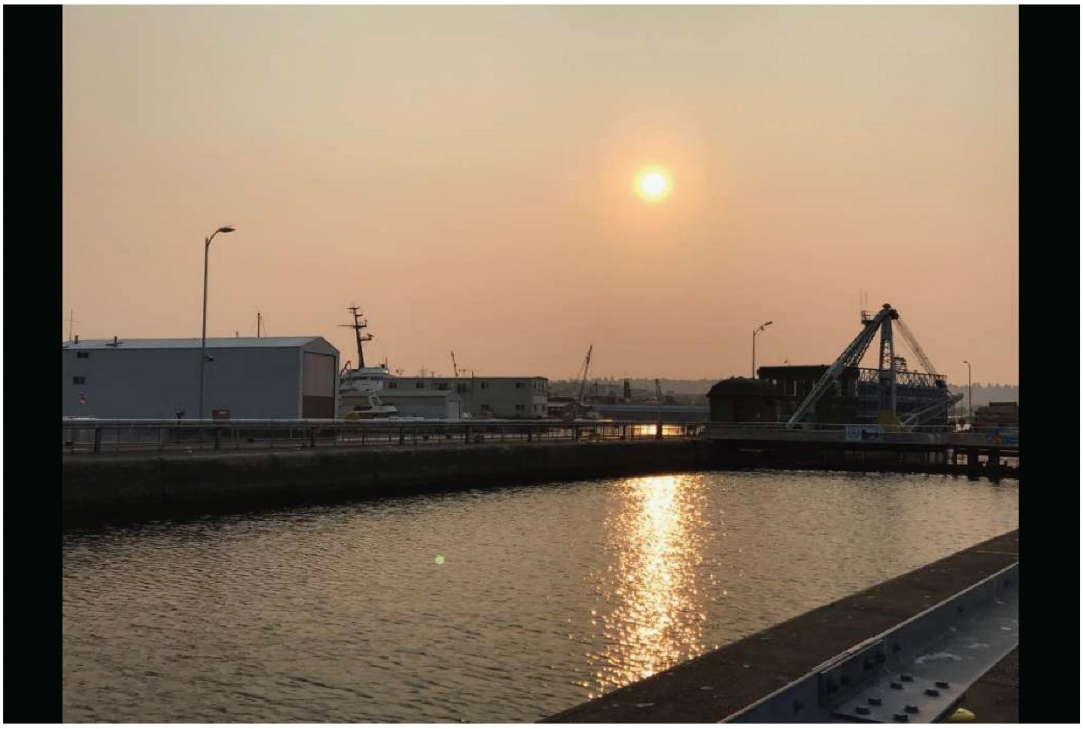

Photo: STEPHEN COHEN / SEATTLEPI.COM

IMAGE 1 OF 31

A layer of wildfire smoke obscured the sun and altered its color Thursday morning, as seen in this photo taken at the Ballard Locks. Air quality was unhealthy and smoke was expected to remain in the area for at least another day.

Seattle's air quality continued to take a beating Thursday afternoon, as smoke from British Columbia wildfires remained in the area.

The eight Seattle-area monitoring stations rated the air quality as unhealthy and two east side monitoring stations rated air quality as very unhealthy Thursday afternoon.

Comparing the Pacific Northwest to China's east coast on a worldwide air quality map, the Northwest of the U.S. appears worse off, showing what an impact wildfire smoke can have.

A look at NOAA graphics showed smoke across all of Washington state and into Idaho and much of Oregon.

The smoke layer was rare for Seattle, where winds coming off the water usually clean the area out more rapidly.

"For Seattle in particular, being close to the coast, it is extremely unusual and hearkens back to the days when there were no burn bans, when there was residential wood burning," said Dr. Sverre Vedal, a University of Washington physician, in a short video released by UW. "But within recent years this is something that just doesn't happen."

Along with the wildfires in British Columbia, several fires were still burning in Washington, Idaho and Oregon, contributing to air quality alerts around the region.

A high pressure system sitting over Washington was to blame for the smoke lingering, and the National Weather Service's latest forecast predicted a clearing Saturday in the Seattle area.

The Washington Smoke Information site predicted on Wednesday that smoke could remain hovered over the state through the weekend.

Smok y Thursday afternoon,

A blood-red moon sets over Seattle, Thursday, August 3, 2017. The unusual coloring is due to smoke coming from wildfires in British Columbia, Canada.
Media: National Weather Service Seattle

triggering more delays for flights in and out of Sea-Tac. Delays for arriving flights were averaging more than an hour Thursday morning.

RELATED: Wildfire growing near Darrington, smoke from BC headed south

At an air quality rating of unhealthy, most people are likely to experience some effects from the smoke, according to information from AirNow. In areas where air is worse, those effects could become more serious.

Watery, irritated eyes, coughing and trouble breathing are all signs of smoke inhalation.

Vedal said in the video that just the heat would exacerbate respiratory and heart disease.

"So, that in combination with the pollution is sort of a double whammy," he said.

Officials advised that those sensitive to smoke should stay inside when possible, preferably in air conditioned spaces.

Vedal said air cleaners would be helpful, particularly those with HEPA filters, and masks could also be helpful in reducing the effects of the smoke.

Mean … continue with a high of 91 degrees Thursday before a slight dip to 89 Friday … id to high 80s into next week, according to the NWS forecast.

Exces… much of the Puget Sound Region, and farther out, red flag warnings were in place…

RELA… ottest day since 2009

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FEEDING AMERICA

worse than China's, due to BC #wildfires. pic.twitter.com/yc34tINj0p — Bruce Englehardt (@SounderBruce) August 3, 2017

A wildfire near Darrington was 10 percent contained, but still burning at 180 acres Thursday morning. The smoke from that fire was dinging the air in Darrington, but with the fire moving east, no homes or other structures were in danger.

In Skagit County, a fire on Chuckanut Mountain, dubbed the Burnout Road Fire, was burning at 60 acres and threatened several homes, according to information from InciWeb.

Farther off, the Diamond Creek fire continued burning in the Okanogan/Wenatchee National Forest covering more an estimated 7,100 acres.

Again, people sensitive to smoke should stay inside in air-conditioned spaces and avoid spending time outside as long as smoke remains in the area. The NWS issued several reminders about staying hydrated and watching for signs of heat exhaustion or heat stroke.

The city has a list of cooling centers that will be open to the public during excessive heat and many of the places are air conditioned so could double as places to escape the smoke.

See the full list here.

And head over to the NWS page here to see tips about staying safe in the heat.

Daniel DeMay covers Seattle culture, city hall, and transportation for seattlepi.com. He can be reached at 206-448-8362 or danieldemay@seattlepi.com. Follow him on Twitter: @Daniel_DeMay.

Sponsored Content

Smoke, poor air quality sticking around

Ed Friedrich, ed.friedrich@kitsapsun.com Published 3:48 p.m. PT Aug. 4, 2017 | Updated 7:21 p.m. PT Aug. 4, 2017

Air quality remains unhealthy

(Photo: Meegan M. Reid / Kitsap Sun)

BREMERTON — Record wildfires and a persistent weather pattern will keep smoke and heat here for the foreseeable future.

British Columbia is experiencing its most destructive wildfire season in 60 years. The B.C. Wildfire Service says 1,900 square miles of forest, brush and grassland have been torched, the second most in the province's history. As of Friday morning, 122 fires were burning, according to the B.C. government, which has issued a state of emergency.

A stubborn ridge of high pressure parked off the Washington coast is causing the wind to blow south, pushing the smoke into western Washington. The weather pattern isn't unusual, said Allen Kan of the National Weather Service in Seattle. The amount of smoke is.

"We happen to be in a pattern that's just right for transporting all that smoke down over the area," he said. "The magnitude of the smoke, how much has been generated, that's out of the ordinary."

There's little relief in sight in the coming days.

"What we were hoping for is a shift in the winds that will take the smoke elsewhere," Kan said. "Unfortunately, it doesn't look like it's going to happen anytime soon. It looks like the ridge is going to sit over the area until early next week. We'll need a good change, probably to some westerly flow, to blow the smoke out of here."

Smoke can make it difficult to breathe. Since Wednesday, the Bremerton-Silverdale-Bainbridge Island air quality index, which represents particle pollution, was not only unhealthy for sensitive groups (101-150) but for everybody (151-200). It peaked at 173. At that level, people with heart or lung disease, older adults and children should avoid prolonged or heavy exertion and move activities indoors. Others should reduce prolonged or heavy exertion and take more breaks. Good air is in the range 0 to 50. The forecast for Saturday is 151.

Steve Van Slyke, who has worked at the Puget Sound Clean Air Agency for 16 years, hasn't seen the agency impose a burn ban during the summer. Normally, smaller bans occur in the winter when everybody is burning wood stoves and the smoke gets trapped by an inversion layer.

"In this circumstance, it just came in and put our monitors to a point that if we saw this in the winter, we missed the boat," he said. "It took the monitors to extremely high levels, unhealthy for everybody. The point of this burn ban is not to bring the level down but to not make it worse."

The agency is motivated to remove the ban as soon as possible. It could happen as early as this weekend, though that doesn't appear likely.

"A lot of people are saying it's summer, it's Seafair weekend, I want to barbecue, I've been planning this barbecue for months," Van Slyke said. "I get it. If you've got the power to change the weather, rub those beads together and make it blow."

Smoke particles haven't been all bad. They've taken the edge — and attention — off of an expected heat wave. A record-setting week was expected to peak at 99 degrees on Thursday. Though a 93 degree reading at Bremerton Fire Station 2 topped the Aug. 3 record of 91, temperatures have fallen short of projections.

"Smoke is like a cloud," said the Weather Service's Kan. "It can reflect some of the heat, some of the sunlight away and filter the sun's rays reaching the surface. It can take several degrees off the temperature."

The forecast for the next several days shows little cooling, with high temperatures in the 80s through Friday. The Weather Service removed an excessive heat warning Friday evening, but continued an air quality alert through Saturday. No rain is expected for the next seven days.

The New York Times

Pacific Northwest Fires Smother Region in Smoke and Ash

A wildfire near Cascade Locks, Ore., near the Columbia River, on Tuesday.
Genna Martin/seattlepi.com, via Associated Press

By Matt Stevens (https://www.nytimes.com/by/matt-stevens) Sept. 6, 2017

Dozens of wildfires that have been raging across the Pacific Northwest flared up this week, unfurling a blanket of opaque smoke from the Cascades to the coast and raining ash down on cars, streets and people.

The blazes have forced evacuations and prompted the governor of Washington to declare a state of emergency (http://governor.wa.gov/sites/default/files/proclamations/proc_17-12.pdf); the skies have turned a disorienting color of brownish-orange, and the air smells of burned wood.

con

Smoke from the Eagle Creek fire near the Bonneville Dam on the Columbia River in Oregon on Tuesday. Mark Graves/The Oregonian, via Associated Press

"If you look outside, you might think it's just clouds," said Logan Johnson, a meteorologist with the National Weather Service's Seattle office. The downpour of salt-and-pepper ash, he added, is like "nothing we've observed in quite some time."

Meteorologists say it has been an unusually dry summer in a region known for rain. It has not rained significantly in Seattle since June, Mr. Johnson said, and meteorologists say it has been more than 50 days since measurable precipitation fell in Portland, Ore.

Instead, a strong ridge of high pressure has settled over much of the Pacific Northwest, heating the air and blocking storms from entering the area. As a result, trees, grass and other foliage have dried out, creating fuel that officials say is ripe for ignition if lightning strikes or sparks fly.

Main Street in Walla Walla, in eastern Washington near the Oregon and Idaho borders, was shrouded in smoke from growing wildfires in neighboring Oregon.
Greg Lehman/Walla Walla Union-Bulletin, via Associated Press

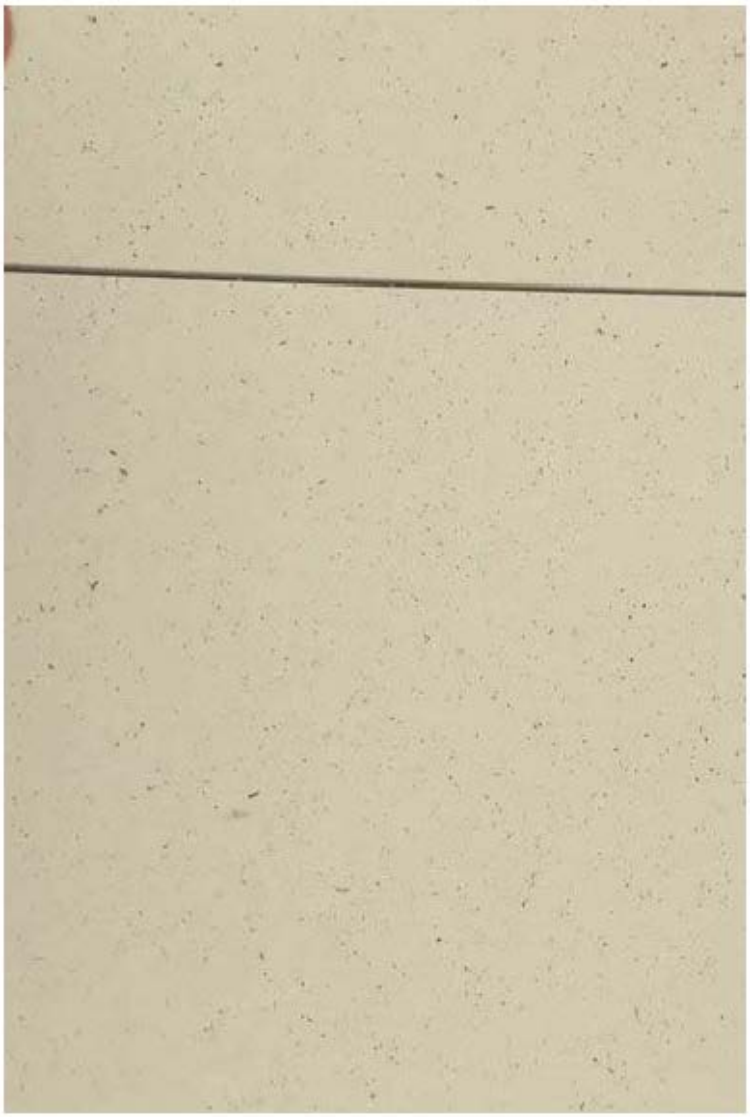
David Bishop, a meteorologist with the service's office in Portland, estimated that about 35 fires were active across the region. Gusty winds helped spread several of them on Monday night, sending a layer of smoke and a downpour of ash into cities like Portland and Seattle.

https://twitter.com/NatStClair/status/905162189790576640
(https://twitter.com/NatStClair/status/905162189790576640)

In Oregon, officials say the Chetco Bar Fire has burned more than 175,000 acres of wilderness since July 12. The Eagle Creek Fire, about 40 miles east of Portland, has burned about 30,000 acres since Saturday and forced several nearby communities to evacuate.

The Diamond Creek Fire, meanwhile, has scarred about 105,000 acres of north central Washington and crossed into Canada; the Norse Peak Fire has scorched almost 45,000 acres near Mount Rainier.

Fascinated locals have snapped photos of the strangely colored skies and rubbed their fingers across their vehicles until they turned dark with soot — as if to prove that the bizarre conditions were real.



(https://www.nytimes.com/2017/08/01/us/seattle-portland-heat-wave.html?action=click&module=RelatedCoverage&pgtype=Article&region=Footer&co

California Today: Is This What Climate Change Looks Like?

(https://www.nytimes.com/2017/09/05/us/california-today-is-this-what-climate-change-looks-like.html?action=click&module=RelatedCoverage&pgtype=Article&region=Footer&co

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More in U.S. (https://www.nytimes.com/section/us?action=click&module=MoreInSection&pgtype=Article&region=Footer&contentCollection=U.S

1:46

For Victims of Nassar, She's Judge and Therapist

Image by Matthew Dae Smith/Lansing State Journal, via Associated Press

After opening her courtroom to athletes, coaches and parents, Judge Rosemarie Aquilina has prompted dozens more to share their stories of sexual abuse by the former sports doctor Lawrence G. Nassar.
(https://www.nytimes.com/video/us/100000005697256/in-nassar-sentencing-judge-prompts-more-victims-to-come-forward.html?action=click&module=MoreInSection&pgtype=Article&region=Footer&contentCollection=U.S.)

42m ago

Ash, smoke from Pacific Northwest's raging wildfires clearing out of Seattle skies

Originally published September 7, 2017 at 7:10 am *Updated September 7, 2017 at 11:31 am*

Smoke from wildfires clouds Interstate 90 in North Bend on Tuesday. (Bettina Hansen / The Seattle Times)

As a weather system from the west moves over Washington's lowlands Thursday, including Seattle, winds and a chance of showers will gradually clear the air, meteorologists say.

By Jessica Lee

Seattle Times staff reporter

Seattle's air quality is improving.

Falling ash and smoke from wildfires across the Pacific Northwest have filled Washington skies since early this week. But as a weather system from the west moves over the state's lowlands, including Seattle, winds and a chance of showers will gradually clear the air, meteorologists say.

Conditions will get better in Western Washington throughout Thursday.

CONTINUE READING BELOW

"It's a very gradual process right now," National Weather Service meteorologist Dustin Guy said. "We do see conditions improving, but it's taking some time."

Web2PDF
converted by Web2PDFConvert.com

Smoke from regional wildfires clouds the sun in Cle Elum and surrounding areas, Tuesday, Sept. 5, 2017. (Bettina Hansen/The Seattle Times)

More on wildfires

- Boeing Insitu drones work to monitor hurricanes, Oregon wildfires
- The little towns near Lake Cle Elum have seen it before
- Crews making headway on Columbia Gorge fire
- Why this Western wildfire season is among the worst
- Heartbreak in Oregon: Wildfire scars beloved Columbia Gorge
- Eagle Creek, Indian Creek fires merge, grow to 20,000 acres; Multnomah Falls Lodge saved
- Ash, smoke from raging wildfires clearing out of Seattle skies
- Here are the largest wildfires in Washington state, Oregon
- Ash falls like snow in Seattle as wildfires rage in Pacific Northwest
- How 'a perfect storm of conditions' led to ash falling on Seattle

That outlook depends on where you are. Air quality in Eastern Washington — where multiple wildfires have threatened homes, prompted evacuations and caused Gov. Jay Inslee to declare a state of emergency — remains at unhealthy levels, according to state ecologists.

People in the Yakima and Spokane areas face the most extreme conditions, with ecologists determining the air "very unhealthy," which means "everyone may experience more serious health effects."

Children, the elderly and patients of respiratory illnesses are most at risk of serious health effects from poor air-quality. Those groups should limit their times outdoors.

Like Thursday, Friday's forecast for Seattle calls for a chance of showers, with a high temperature around 74 degrees. Saturday's outlook is about the same, with slightly cooler temperatures. Then, partly sunny skies will brighten the metro area on Sunday, according to the service's extended forecast.

The ash and smoke, which filled Seattle skies since early this week, was unlike anything the city has seen before. Even when Mount St. Helens erupted in 1980, Seattle did not get a similar sort of covering, with the ash blowing south and east, according to many people who lived here during the event.

Material from The Seattle Times archives was used in this report.

CONTINUE READING BELOW

CONTINUE READING BELOW

***Jessica Lee**: 206-464-2532 or jlee@seattletimes.com; on Twitter: @jessleeST.*

View 2 Comments

Recommended in
The Seattle Times

'Deadliest Catch'…

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Spokane Regional Clean Air Agency

Date: April 17, 2019

To: Jacob Berkey, Laurie Hulse-Moyer, Sean Lundblad

From: Margee Chambers Margee Chambers

CC: Ecology: Nancy Pritchett, Jill Schulte
Spokane Clean Air: Julie Oliver, Mark Rowe

Re: Consolidated 2018 Request for Exceptional Event Informational Flagging Memo:
$PM_{2.5}$ exceedances August 8, 10, 13-16, 19-23, 2018 (11 days)
PM_{10} exceedances August 19-20, 2018 (2 days)
Elevated PM_{10} concentrations September 8, 2017, August 13 - 16 and August 23, 2018 (6 days)

Spokane Regional Clean Air Agency (Spokane Clean Air) requests that the Washington State Department of Ecology (Ecology) place an informational flag on the below dates recorded at the Spokane - Augusta Avenue site as exceptional events and enter a description into the U.S. Environmental Protection Agency's (EPA) Air Quality System (AQS):

- $PM_{2.5}$ exceedances August 8, 10, 13-16, 19-23, 2018 (11 days)
- PM_{10} exceedances August 19-20, 2018 (2 days)
- Elevated PM_{10} concentrations September 8, 2017 (1 day)
- Elevated PM_{10} concentrations August 13 - 16 and August 23, 2018 (5 days)

EPA's Exceptional Event Rule (EER) provides a process for excluding qualifying exceedances from calculations when determining compliance with National Ambient Air Quality Standards (NAAQS) and the limited maintenance plan (LMP) approach. The first step in the process is informational flagging of the data in the monitoring record and entering an event description.

In August 2018, during a period of severe wildfire smoke impacts, winds transported smoke and ash from regional wildfires in California, Idaho, Montana, Oregon, Washington, and British Columbia into the Spokane-area. This resulted in some of the worst air quality on record for the region. Spokane Clean Air requests that Ecology i-flag exceedance data believed to have been affected by the regional wildfires.

2018 wildfire smoke impacts resulted in 24-hour $PM_{2.5}$ concentrations:

Spokane – Augusta Avenue Site (AQS# 530630021)
$PM_{2.5}$ FEM BAM-1020 Serial number: T15027 Tag number: E139344

PM2.5 Exceedance I-flag Data	
Date	**PM2.5**
8/8/2018	38.6 µg/m^3
8/10/2018	38.2 µg/m^3
8/13/2018	71.7 µg/m^3
8/14/2018	66.7 µg/m^3
8/15/2018	58.5 µg/m^3
8/16/2018	51.6 µg/m^3
8/19/2018	185 µg/m^3
8/20/2018	150.3 µg/m^3
8/21/2018	49.5 µg/m^3
8/22/2018	48.8 µg/m^3
8/23/2018	61.7 µg/m^3

2018 wildfire smoke impacts resulted in 24-hour PM_{10} concentrations:
Spokane – Augusta Avenue Site (AQS# 530630021)
PM_{10} TEOM 1400AB Serial number: 140AB252210406 Tag number: SCAPCA 06225

PM10 Exceedance I-flag Data	
Date	**PM10**
8/19/2018	221 µg/m^3
8/20/2018	180 µg/m^3

Spokane Clean Air requests that Ecology i-flag sub-exceedance level data believed to have been significantly affected by wildfire smoke exceptional events that occurred in 2017 and 2018, for continued use of the LMP option for the PM_{10} maintenance area. Spokane Clean Air realizes that two of the dates with high PM10 concentrations (8/13/18 and 8/16/18) are below the 98-155 µg/m^3 threshold that the May 7, 2009 EPA Harnett memo states agencies can use in determining eligibility for the LMP option, but would like them flagged.

This resulted in elevated 24-hour PM_{10} concentrations:
Spokane – Augusta Avenue Site (AQS# 530630021)
PM_{10} TEOM 1400AB Serial number: 140AB252210406 Tag number: SCAPCA 06225

PM10 High Concentrations I-flag Data	
Date	**PM10 Levels**
9/8/2017	127 µg/m^3
8/13/2018	92 µg/m^3
8/14/2018	98 µg/m^3
8/15/2018	107 µg/m^3
8/16/2018	95 µg/m^3
8/23/2018	107 µg/m^3

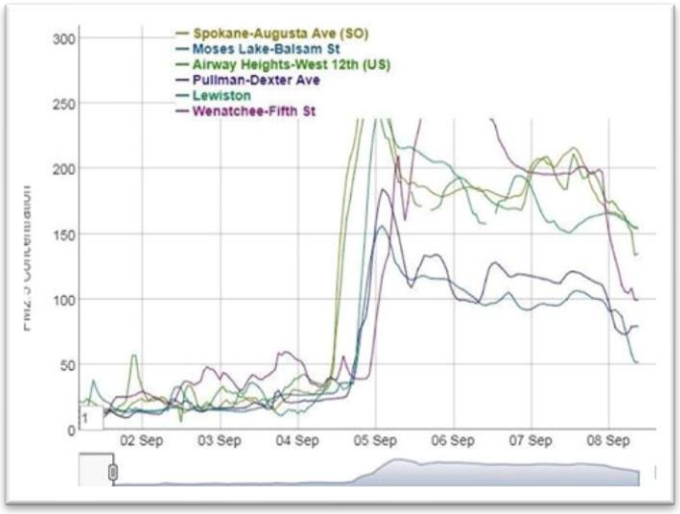
Supplemental Information:

September 8, 2017

US National Weather Service Spokane Washington

September 8 at 10:16am ·

Monitors across the Columbia Basin are showing improving air quality.



US National Weather Service Spokane Washington

2 hrs ·

Today is the day! If you're like me, you may be a little giddy over the idea that smoke should decrease today! Until then, air quality remains Unhealthy to Hazardous this morning. Smoke should diminish during the day although hazy skies are still likely to persist. It's not until Saturday afternoon that the Inland Northwest can expect a more significant....dare I say, CLEARING?!!

Otherwise, we've seen a few lightning strikes overnight. More isolated thunderstorms are possible this afternoon mainly near the Canada border and the Idaho panhandle.

August 8, 2018

SRCAA Web Article:

Air Quality Forecast (8/7/18)- High pressure will bring increasing temperatures to the region, with light winds providing little air movement. Expect continued smoke (PM-2.5) impacts from local and regional wildfires along with increased ozone from the hot and sunny weather. Although air quality should remain in the upper portion of the AQI-Moderate range on Tuesday and Wednesday, changes in the wind and fire activity may cause air quality to worsen at times.

Update: August 7, 2018

As of 12:15 pm, air quality has reached into the "Unhealthy for Sensitive Groups" or "Orange" on the Current Air Quality Index. The Current AQI is updated hourly here.

Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy for Sensitive Groups 101-150	Sensitive groups include people with heart or lung disease, older adults, children and teenagers.	Sensitive groups: *Reduce* prolonged or heavy exertion. It's OK to be active outside, but take more breaks and do less intense activities. Watch for symptoms such as coughing or shortness of breath. People with asthma should follow their asthma action plans and keep quick relief medicine handy. If you have heart disease: Symptoms such as palpitations, shortness of breath, or unusual fatigue may indicate a serious problem. If you have any of these, contact your heath care provider.

Update: August 8, 2018

Air quality is in the "Unhealthy for All" or "Red" on the Current Air Quality Index, which is updated hourly here.

Unhealthy 151 to 200	**Everyone**	**Sensitive groups: *Avoid* prolonged or heavy exertion. Move activities indoors or reschedule to a time when the air quality is better.** **Everyone else: *Reduce* prolonged or heavy exertion. Take more breaks during all outdoor activities.**

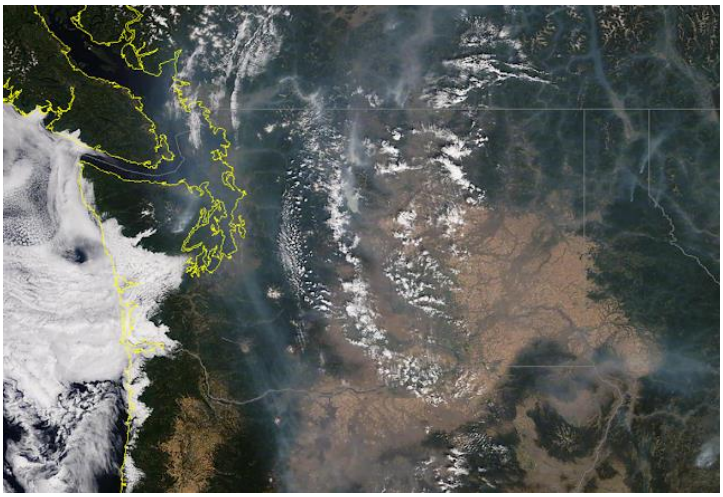
Today's 2-day Air Quality Forecast (8/8/18) - Hot dry weather will continue to promote the growth of regional wildfires, with high pressure limiting air movement and trapping smoke (PM-2.5) near the surface. Significant smoke plumes from the Cascade wildfires along with other local and regional wildfires will produce increased smoke (PM-2.5) impacts along with elevated ozone concentrations from the hot and sunny weather. Depending on the winds and fire activity, air quality may reach the AQI-Unhealthy range at times on Wednesday and Thursday.

AQI Guide for Particle Pollution

August 10, 2018

SRCAA Facebook:
Depending on the winds and fire activity, air quality will likely remain in the Unhealthy for Sensitive Groups/Orange for most of today, but might reach Unhealthy/Red briefly on Saturday if smoke drifts this direction. Air Quality should be improved for Sunday but light winds and poor ventilation may still allow air quality to reach the Unhealthy for Sensitive Groups/Orange at times on Sunday and Monday. For hourly updates, please check www.spokanecleanair.org/current-air-quality.

WA Smoke Blog:
Prefer the forecast the same old way?
Satellite picture from this morning shows a lot of smoke overhead and fires in the Cascades puffing out a lot of smoke.



The clouds offshore are a harbinger of a cold front that will clear things out by tonight into Saturday. Most of western WA should see Good air this weekend, but there might be some lightning on Saturday so the potential exists for new fire starts.

Much of eastern Washington has been choking and frying all week but will see some improvement, both from smoke and heat. Areas further from the fires are likely to enjoy Good air and this is a great time to throw open all the doors and windows to flush out homes.

Unfortunately areas closer to the fires, especially Chelan and Okanogan counties will only enjoy modest improvements.

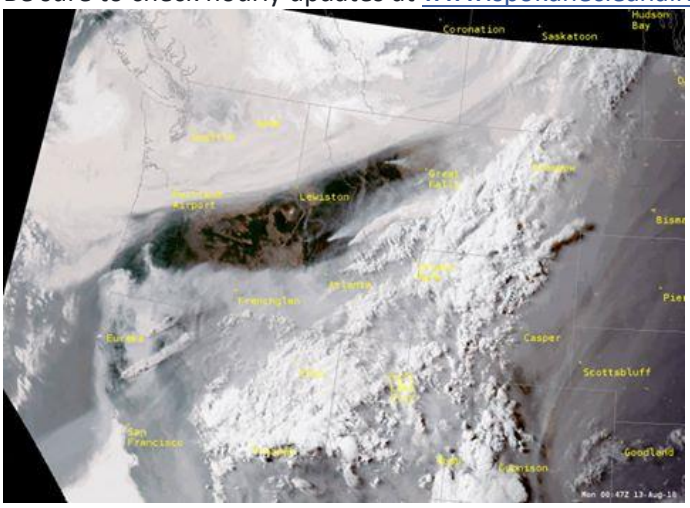
Catch-22
Them winds dont come with no string attached. They're strong enough to worsen fire growth. Early next week we're likely to see a return to calmer conditions so fresh smoke will not dissipate easily.

August 13, 2018

SRCAA Facebook:

Smoke is blanketing much of Washington this morning. In Spokane, we're seeing the impacts and have a current air quality of "Unhealthy/Red".

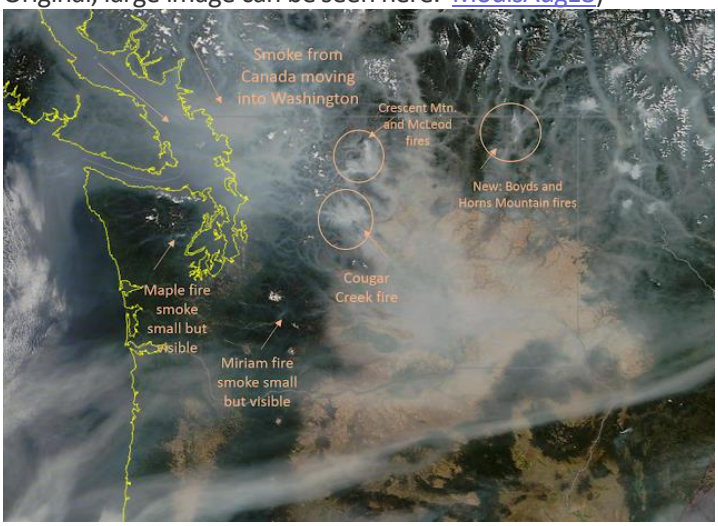
Be sure to check hourly updates at www.spokanecleanair.org/current-air-quality



WA Smoke Blog:

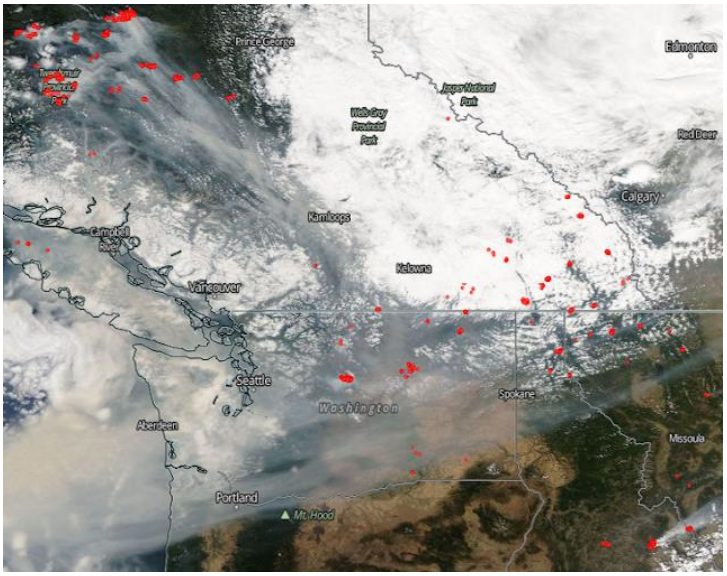
Smoky State overview

Smoke is moving south into the state from Canada plus some of the smoke from fires east of the Cascades has filtered over the mountains into the Puget Sound area. There are other fires in the state contributing to the mix, including the large Grass Valley fire near Grand Coulee Dam but the fires indicated are the ones contributing the most to poor air quality around the state. (Satellite photo from about 2pm this afternoon. Original, large image can be seen here: ModisAug13)



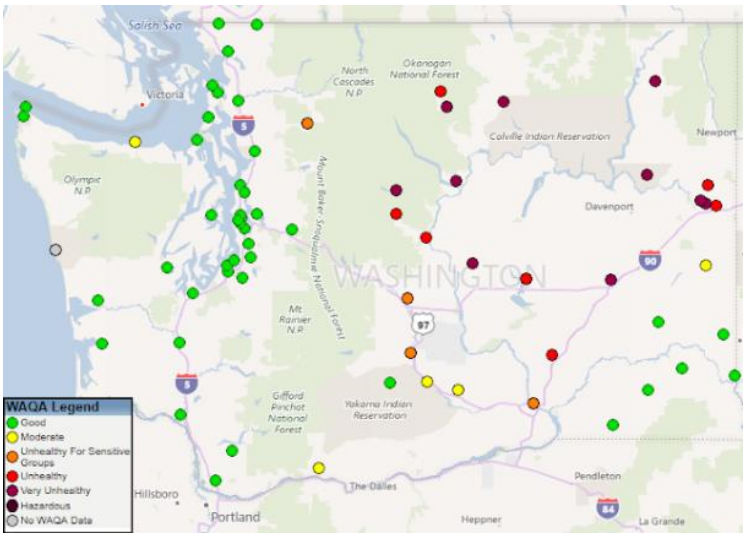
Where is all this smoke coming from?

A shift in winds over the weekend brought a thick haze from Canada that is covering most of our state. Fortunately, residents in Western Washington are still experiencing Good air quality, with the exception being places at higher elevations in the Cascades experiencing air quality that is Unhealthy for Sensitive Groups. Some smoke might make its way from Canada into the Puget Sound lowlands later today and tomorrow, but westerly winds should return on Wednesday and clear out any lingering smoke.



MODIS Image from Sunday afternoon with fire locations shown in red.

Residents in the northern parts of Central and Eastern Washington are experiencing severe smoky conditions due to both local and regional wildfires that are currently burning. Monitors are showing Unhealthy to Very Unhealthy air quality from Wenatchee to Spokane, with no clearing expected in the near-term forecast. Light winds from the north are expected to continue throughout the day, which means residents in Yakima, Benton, and Franklin counties could see conditions worsen to Moderate to Unhealthy. Southeastern Washington may not get too bad, but it won't be surprising if we see Moderate to Unhealthy for Sensitive Groups air quality in Walla Walla, Asotin, and other nearby counties.



PM2.5 Monitors on Monday Morning

The National Weather Service has issued an air quality alert for all of central and eastern Washington. This will be updated on Wednesday, and we hope southern counties will only be experiencing short-lived smoky conditions.

August 14, 2018

NWS Facebook:

Unhealthy air quality spans across the Inland NW today and it can impact your health. Avoid spending too much time outdoors when conditions are poor.

SRCAA Facebook:

Good information from Spokane Regional Health District about using face masks when we have unhealthy air quality.

Spokane Regional Health District
August 13 at 1:57 PM ·

AIR QUALITY & FACE MASKS: Remember, it is better to stay indoors than to mask.

The right face mask can only provide some protection for some people for a limit...

8/15/2018 British Columbia once again dealing with a very bad wildfire year - and we're getting some of the smoke

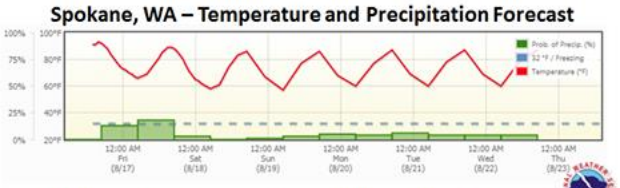
The B.C. Canada government declared a state of emergency today (Wednesday 8/15/18) due to wildfires. Approximately 566 wildfires are burning in B.C, with 29 evacuation orders affecting approximately 3,050 people. An additional 18,720 people are under evacuation alert. This is the second year in a row our neighbors to the north have been inundated with fire and smoke and some of that smoke has been heading south to Washington and beyond.

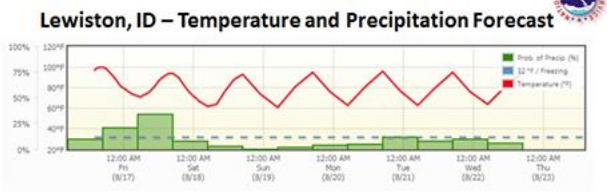
The best air quality models that predict smoke movement and accumulation in the Pacific Northwest, don't include fires and smoke from that far north. Other models do include the fires in Canada although their resolution is not as good so predicting air quality impacts in Washington as affected by smoke from Canada is rather challenging. The satellite photo below, taken yesterday (Tuesday) shows the red "hot spots" marking the large areas of fire in B.C. Fires in Washington can also be seen to the south. Note the magnitude of the smoke accumulation just north of the international border. We've already received some smoke from the north, how much more will travel to Washington in the coming days?

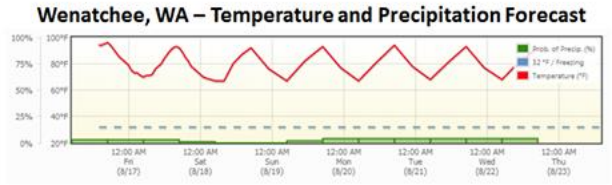
Another satellite photo from yesterday got a really clear view of fires and smoke around Washington. Plumes from the Crescent Mountain and McLeod fires are clearly visible north of Lake Chelan in the Methow Valley area, and the Cougar Creek plume is visible to the south of Lake Chelan closer to the center of the state. Large image available at the link: ModisAqua8_14

August 16, 2018

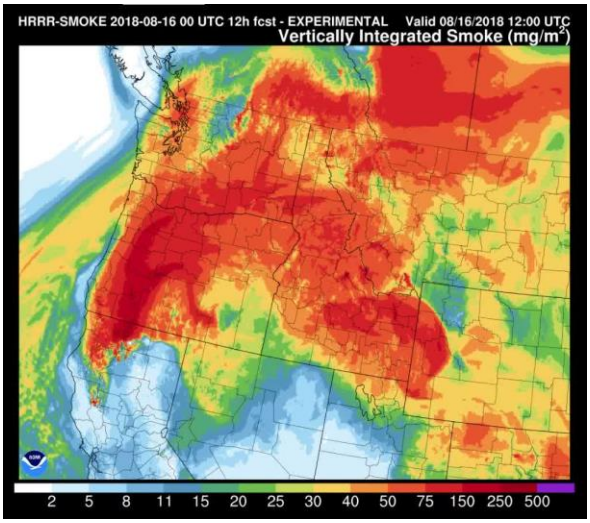
NWS Facebook:
We have good news and bad news. The good news is that we don't foresee any major warm ups the likes of which we saw last week. The bad news is there's little chance of rain over the next several days #wawx #idwx







NWS Facebook:
The latest model simulation of #wildfire smoke east of the Cascades - 5AM today to 5AM Friday



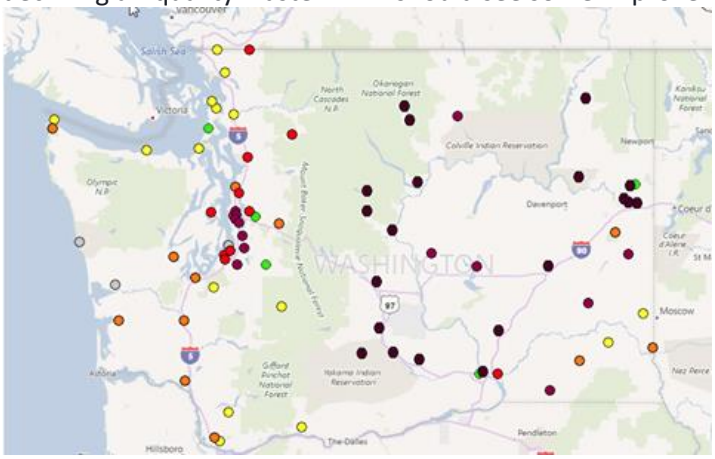
August 19, 2018

SRCAA Facebook:

With air quality at the "Hazardous/Maroon" level, it's very important to keep yourself safe. Spokane Regional Health District provides guidance on symptoms from exposure to wildfire smoke.

NWS Facebook:

Hazardous air quality in nearly all of eastern WA this evening. Even Puget Sound area is now seeing declining air quality. Eastern WA should see some improvement tomorrow.



August 20, 2018

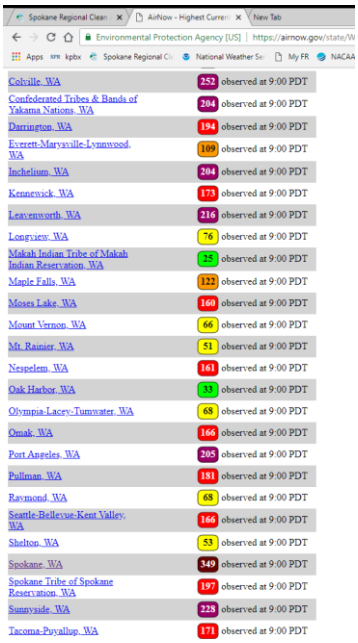
SRCAA Website Update:

Update: Monday, August 20, 9:15 am: Current air quality is in the “Hazardous” or “Maroon” level on the Air Quality Index for fine smoke particles. Click here for current information and forecast.

Hazardous 301-500	Everyone	**Everyone:** *Avoid all* physical activity outdoors. **Sensitive Groups:** Remain indoors and keep activity levels low. Follow tips for keeping particle levels low indoors.

SRCAA Facebook:
According to the Washington Smoke Information blog, we're not likely to see the smoke clearing until Friday. http://wasmoke.blogspot.com/…/tell-us-plainly-when-will-smo…

Airnow WA List:

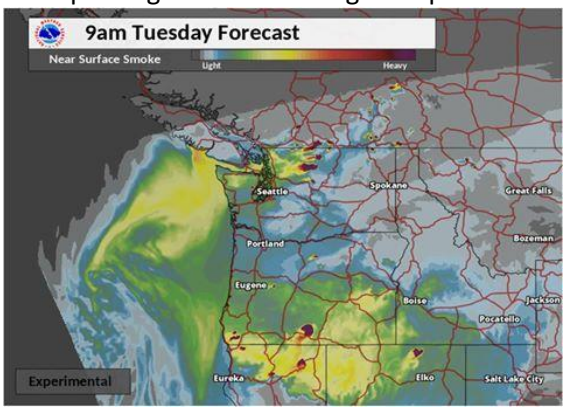


Colville, WA	252 observed at 9:00 PDT
Confederated Tribes & Bands of Yakama Nations, WA	204 observed at 9:00 PDT
Darrington, WA	194 observed at 9:00 PDT
Everett-Marysville-Lynnwood, WA	109 observed at 9:00 PDT
Inchelium, WA	204 observed at 9:00 PDT
Kennewick, WA	173 observed at 9:00 PDT
Leavenworth, WA	216 observed at 9:00 PDT
Longview, WA	76 observed at 9:00 PDT
Makah Indian Tribe of Makah Indian Reservation, WA	25 observed at 9:00 PDT
Maple Falls, WA	122 observed at 9:00 PDT
Moses Lake, WA	160 observed at 9:00 PDT
Mount Vernon, WA	66 observed at 9:00 PDT
Mt. Rainier, WA	51 observed at 9:00 PDT
Nespelem, WA	161 observed at 9:00 PDT
Oak Harbor, WA	33 observed at 9:00 PDT
Olympia-Lacey-Tumwater, WA	68 observed at 9:00 PDT
Omak, WA	166 observed at 9:00 PDT
Port Angeles, WA	205 observed at 9:00 PDT
Pullman, WA	181 observed at 9:00 PDT
Raymond, WA	68 observed at 9:00 PDT
Seattle-Bellevue-Kent Valley, WA	166 observed at 9:00 PDT
Shelton, WA	53 observed at 9:00 PDT
Spokane, WA	349 observed at 9:00 PDT
Spokane Tribe of Spokane Reservation, WA	197 observed at 9:00 PDT
Sunnyside, WA	228 observed at 9:00 PDT
Tacoma-Puyallup, WA	171 observed at 9:00 PDT

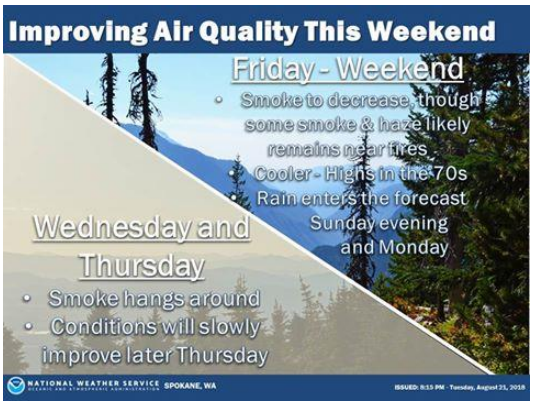
August 21, 2018

NWS Facebook:
The morning visible satellite image shows just how widespread the smoke is across the Pacific NW, keeping our skies hazy & smoky. Although there have been some improvements in air quality, it will still be a concern today as winds become light, especially near local fires.

Air quality alerts continue, with many remaining in the "unhealthy" category. However conditions may be improving for some through the period.

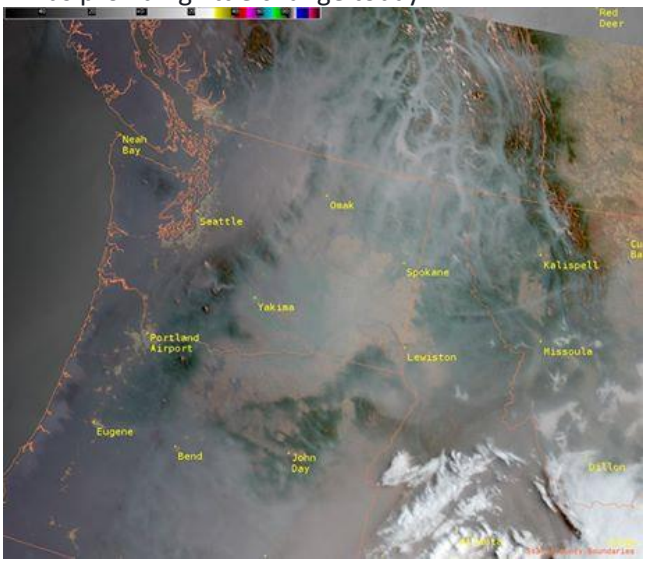


NWS Facebook:
A pattern change is on the way! Late Thursday a cold front will move through providing some improving conditions to the smoke and haze. Then this weekend we cool down and by Sunday evening and Monday we have a chance of rain which would further improve conditions!

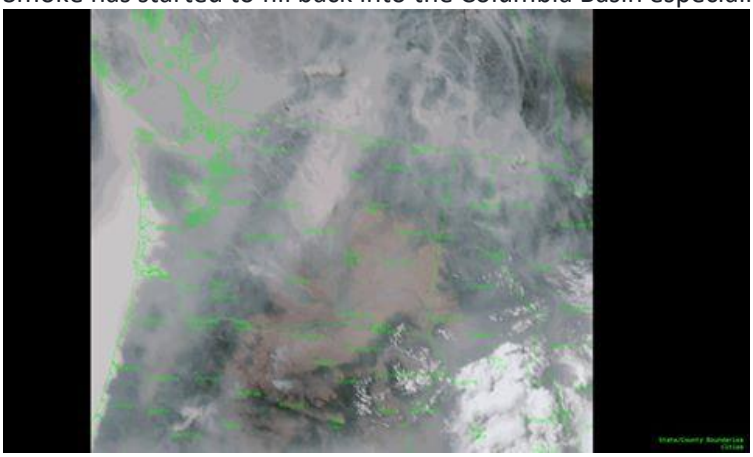


August 22, 2018

NWS Facebook:
Early morning visible satellite image shows the blanket of smoke across the Inland NW. Expect light winds providing little change today.



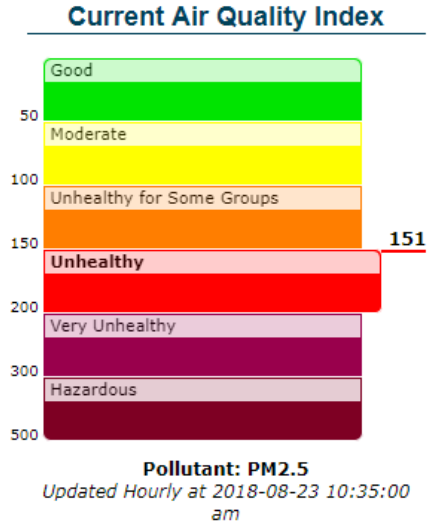
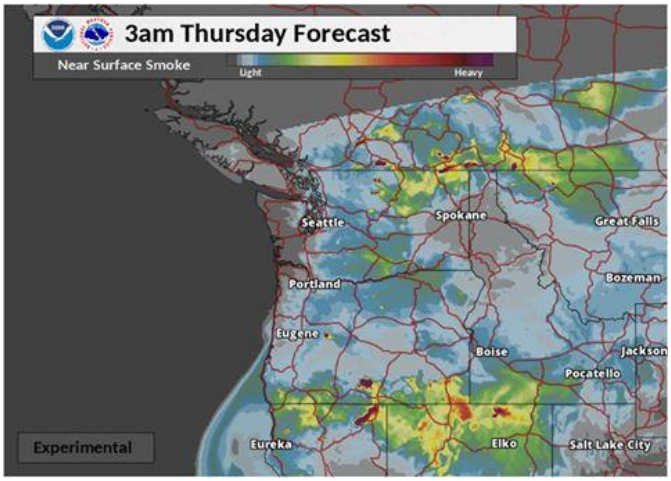
NWS Facebook:
Smoke has started to fill back into the Columbia Basin especially the Okanogan Valley.



August 23, 2018

SRCAA Facebook:
As of 10:35 am, Spokane's current air quality is back in the "Unhealthy/Red" category. This means that everyone, especially sensitive groups should limit time spent outdoors.

A dry cold front is providing good westerly flow across the state and we could see some clearing later this afternoon. You can check hourly updates at www.spokanecleanair.org/current-air-quality



NWS Facebook:
Wildfire smoke continues to impact the region, but looking at this experimental model suggest some improvement later today into tonight. Yay! However, looking toward the end of the loop there may be another influx of smoke from BC.