Salmon Airshed Path Forward 2021 Update

State of Idaho
Department of Environmental Quality
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Abbreviations, Acronyms, and Symbols

µg	microgram
AQI	Air Quality Index
BLM	United States Bureau of Land Management
DEQ	Idaho Department of Environmental Quality
DV	design value
EPA	US Environmental Protection Agency
m	meter
NAAQS	National Ambient Air Quality Standard
NEI	National Emissions Inventory
PM	particulate matter
RWC	residential wood combustion
USFS	United States Forest Service

1 Introduction

In 2018, the city of Salmon prepared a PM Advance Plan in conjunction with the Idaho Department of Environmental Quality (DEQ). For the past few years, the city has been implementing the plan and seeing the results of their efforts. In the winter months, fine particulate matter ($PM_{2.5}$) is the biggest concern in Salmon airshed due to smoke impacts from woodstoves, fireplaces, and other wood-burning appliances. Wildfire smoke is the dominant concern in the summer. Other sources of $PM_{2.5}$ include open burning, prescribed burning, wildfires, and some road dust from vehicle travel.

In recent years, monitoring showed that the Salmon area struggled to meet the 24-hour $PM_{2.5}$ standard. During the 2017–2019 season, when wildfire days are removed from the analysis, $PM_{2.5}$ levels were well below the standard, with the 3-year average (2017–2019) showing compliance with the 24-hour standard.

2 Key Strategies

To continue to meet the standard, the Salmon airshed will need to maintain and enhance their key strategies of reducing $PM_{2.5}$ from woodstoves, open burning, and other sources of fine particulate matter. Compliance with their voluntary curtailment and continuing replacing uncertified woodstoves are critical to the area's success.

3 Overview and Monitoring

Salmon is a small community in southeastern Idaho with a population of 3,169 people in 2016 (US Census Bureau 2018). The Salmon airshed includes the communities of Salmon, Carmen, Shoup, North Fork, Elk Bend, Ellis, Lemhi, Tendoy, Gibbonsville, Baker, and Cobalt. The eastern boundary of the airshed follows the Idaho-Montana border along the Bitterroot Range and the Continental Divide. Population density is low and land use is a mixture of forested mountains, developed land, pasture/hay, grassland, and shrub-covered hills. Salmon sits at the confluence of the north-flowing Salmon River and the northwesterly trending Lemhi River valley. Surface wind patterns are dominated by drainage flows in these directions. The airshed is adjacent to the 2.3-million acre Frank Church River of No Return Wilderness Area, the largest wilderness area in the lower 48 states.

DEQ has monitored air quality in the Salmon area since 2003, with the exception of a brief period from mid-2005 through 2006. DEQ uses a regulatory monitor to assess compliance with the National Ambient Air Quality Standard (NAAQS), and a continuous monitor is used to support air quality forecasting and smoke management programs. The monitors are located on Charles Street in Salmon.

3.1 Monitoring Results

The Salmon airshed has met the annual $PM_{2.5}$ standard after exceptional events have been excluded. However, Salmon's daily design value (DV) concentrations have been consistently above the 35 microgram per cubic meter ($\mu g/m^3$) 24-hour NAAQS even when wildfire influences are removed. Since the daily NAAQS was revised in 2006, the Salmon airshed exceeded that standard every year between 2010 and 2018 (DEQ 2018[1]; Table 1). The most recently available monitoring data show that the 2017–2019 24-hour DV meets the daily NAAQS for the first time in over a decade (Table 2).

Table 1. 2016–2018 preliminary design values for the Salmon monitor.

98th-Percentile 24-hour Concentration ($\mu g/m^3$)			2016–2018 24-hour DV ($\mu g/m^3$)	2016–2018 Annual DV ($\mu g/m^3$)
2016	**2017**	**2018**		
39/**39**	60/**40**	31/**31**	43/**37**	11.4/**9.7**

Note: Bold indicates exceptional events were excluded.

Table 2. 2017–2019 preliminary design values for the Salmon monitor.

98th-Percentile 24-hour Concentration ($\mu g/m^3$)			2017–2019 24-hour DV ($\mu g/m^3$)	2017–2019 Annual DV ($\mu g/m^3$)
2017	**2018**	**2019**		
60/**40**	31/**31**	32/**32**	41/**34**	10.3/**8.7**

Note: Bold indicates exceptional events were excluded.

In both tables, concentration data are denoted with/without all flagged exceptional event data included. Bolded concentrations indicate where flagged exceptional event data were excluded. The concentration values may change depending on how many of the flagged exceptional events are documentable, as concurred by the US Environmental Protection Agency (EPA). Concurred events are removed from DV calculations.

The Salmon airshed continues to experience the most exceedances of the particulate matter standard in the winter months. Over 80% of the daily exceedances occurred in the first and fourth quarters during the 2018–2020 period (Table 3) when temperatures are low and people rely on fireplaces and woodstoves for heating. The remaining 16% of exceedances occurred in the third quarter (August and September) and are most likely associated with wildfire smoke.

[1] *https://www.epa.gov/sites/production/files/2018-09/documents/path_forward.aug_2018.pdf*

Table 3. Seasonal distribution of $PM_{2.5}$ daily standard exceedances in the Salmon airshed (2018–2020).

Quarter (calendar year)	Number of Daily Exceedances	Number of Wildfire Flagged Data
2018		
1	12	0
3	8	8
4	13	0
2019		
1	13	0
4	13	0
2020		
1	17	0
3	9	9
4	17	0
Total	102	17

4 Emissions Inventory Update

Of all the $PM_{2.5}$ sources, residential wood combustion (RWC) was the largest contributor of fine particulates in the winter, followed by on-road emissions from tailpipes and dust from paved roads in the airshed's 2014 emission inventory (Figure 1). RWC is burning wood to heat residential housing, including woodstoves, pellet stoves, fireplaces, and fireplace inserts. Residential outdoor recreational warming fires are shown under its own category.

Some of the source categories were adjusted or considered insignificant based on local knowledge. Certain sources—such as windblown dust, unpaved road dust, emissions from the agricultural sector (livestock, fertilizer application, and crop residue burning), and wildfires and prescribed fires—do not contribute to airshed emissions during the winter months due to high relative humidity and high surface moisture conditions or because they do not take place during the winter.

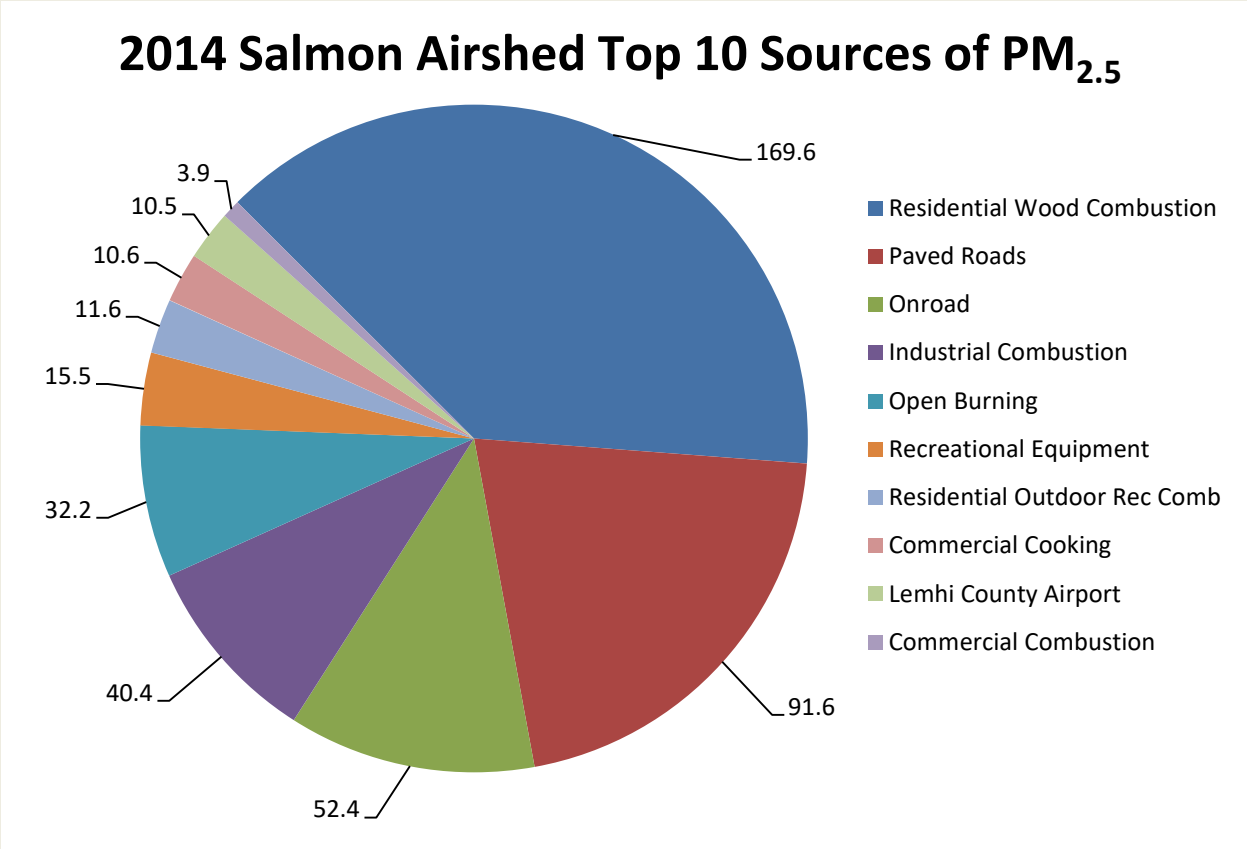

Figure 1. Top pounds per day $PM_{2.5}$ sources in the Salmon airshed—winter emissions inventory (2014 NEI).

One prescribed fire activity in the 2017 emission inventory that occurred on December 6 was captured in the winter day inventory (197 pounds per day average for December). This activity is atypical since prescribed fires do not normally occur this late in the year in the airshed and are considered a winter source of particulate matter pollution specific to the 2017 emissions inventory. Aside from the prescribed fire emissions (not shown in Figure 2), sources had similar proportional impacts to particulate pollution in the airshed in both 2014 and 2017 (Figure 2).

In 2017, a decrease occurred in $PM_{2.5}$ emissions from RWC and on-road sources and in open burning and industrial combustion. The 2017 RWC emissions were calculated the same way as the 2014 RWC emissions and accounted for the change in population and woodstove changeouts from 2015–2017. $PM_{2.5}$ reduction from RWC was expected due to woodstove changeouts and outreach efforts to increase awareness of better burning practices. DEQ expanded outreach efforts during the 2019 heating season. The 2017 National Emissions Inventory (NEI) represents the most recent emissions data for the airshed, and accounts for expected emission reductions from the ongoing PM advance strategies.

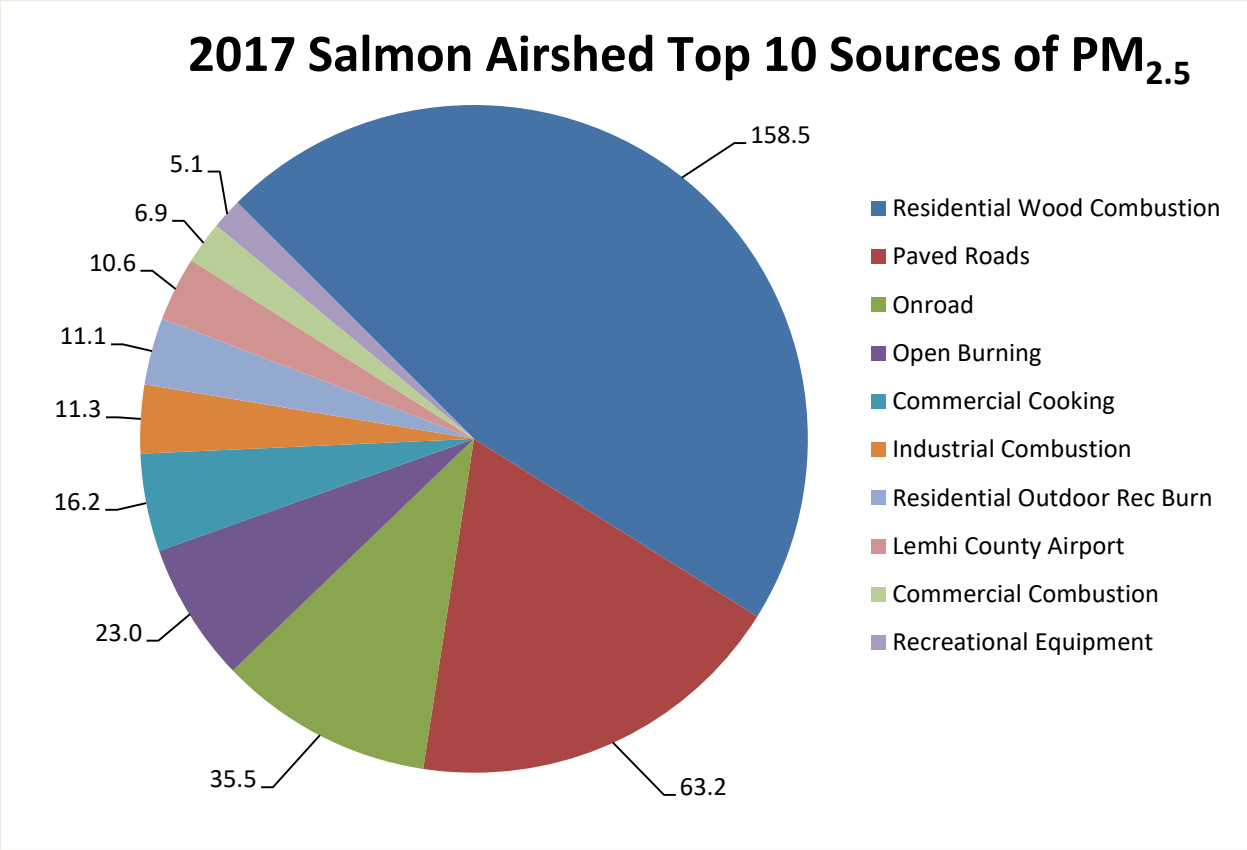

Figure 2. Top pounds per day $PM_{2.5}$ sources in the Salmon airshed—winter emissions inventory (2017 NEI).

5 Implemented Strategies

The strategies implemented focus on public outreach, woodstove curtailment and changeout, and open burning.

5.1 Public Education and Awareness

An electronic sign was installed at a central location in town and has been used extensively to communicate air quality messages to airshed residents. DEQ relies on the air quality sign for day-to-day messages on the Air Quality Index (AQI), air quality forecast and cautions, calls to voluntarily curtail woodstove use during inversion episodes, as well as action to take during degraded air quality episodes. The electronic sign is central to DEQ's ability to increase its communications reach within the airshed.

Since 2018, the following public education efforts have been implemented:

- The Salmon Clean Air Committee (SCAC) partnered with several local stakeholders to increase distribution of materials:

    - US Forest Service (USFS) and US Bureau of Land Management (BLM) to distribute Burn Wise materials with wood-harvesting permits.
    - Local stove retailers, the city of Salmon, local health clinics, school administrators, and the Salmon Public Library to distribute general informational materials.
    - The program is considering mailing Burn Wise materials with local water bills during the winter.
- DEQ purchased stovepipe thermometers and wood moisture meters and made them available for use through a checkout program at the Salmon Public Library.
- The program established "no idle zones" by placing signs, with permission, in targeted areas around the city where idling vehicles most commonly aggregate.
- Participation in the Lemhi County fair.
- Expanding air quality advisory announcements and voluntary curtailment calls to the local radio station.

DEQ made existing resources available to interested schools in the community to assist teachers in providing environmental education related to air quality. DEQ's interactive activity, "Inversion in a Cup," demonstrates the concept of inversions and is appropriate for all age groups. The Salmon School District has been running EPA's AQI flag program at Pioneer Elementary School and the Salmon junior and senior high schools.

5.2 Voluntary Woodstove Curtailment Program

Starting with the 2018–2019 heating season, DEQ implemented a voluntary woodstove curtailment program. This program has two levels based on forecasted air quality:

- Level 1—AQI forecasted to reach between 80 and 100
    - Voluntary curtailment and communication focused on homeowners with uncertified woodstoves with other sources of heat.
- Level 2—AQI forecasted to reach 101 or higher
    - Voluntary curtailment and communication will address all homeowners and business owners with woodstoves, both uncertified and certified, with other sources of heat.
    - DEQ will issue a Stage 1 advisory (called a forecast and caution as defined in IDAPA 58.01.01.556) that will prohibit all open burning in the airshed.

Since 2018, DEQ has issued a couple of air quality advisories due to increased winter particulate pollution. These messages were broadcast by local radio stations, the electronic sign, and on local air quality groups and DEQ's Facebook pages.

- December 12, 2018
- January 11 and December 23, 2019
- Level 1 voluntary curtailment January 21, 2020

To communicate a voluntary curtailment event, DEQ issued statements and pertinent information through the electronic sign, DEQ's social media outlets and website, EPA AIRNow, and an extensive email distribution list that includes broadcast and print media, law enforcement, public health agencies, other government agencies, schools, and other interested parties.

5.3 Woodstove Changeout Program

DEQ secured funds to implement a changeout program in the Salmon airshed totaling $100,000. The woodstove changeout efforts started in December 2019. Seventeen replacements have occurred as of February 2021. To date, eight new woodstoves, one pellet stove, and eight new propane units replaced uncertified woodstoves.

5.4 Open Burning

DEQ regulates all forms of open burning (IDAPA 58.01.01.600–624). These rules prohibit burning certain materials and allow the open burning of others within specific guidelines.

Individuals living outside city limits anywhere in Idaho must obtain a fire safety burning permit from the Idaho Department of Lands during the closed fire season (May 10–October 20). It may also be necessary to notify the local fire department prior to burning.

Since 1974, a local ordinance in Salmon bans residents from burning residential solid waste of any kind within the city (Ord. 74-397, 6-3-74). DEQ has worked with local media outlets and social media to inform the public of the existing ordinance through news releases and community announcements. The air quality sign in town also broadcasts messages focused on open-burning.

6 Future Efforts

To maintain and enhance key strategies for reducing $PM_{2.5,}$ the following efforts are planned:

- DEQ is continuing the woodstove changeout program and has secured an additional $40,000 to fund the program. Rebates ranging between $2,000 and $4,000 dollars will fund the replacement of up to 20 additional stoves.
- DEQ is working with the local paper and radio station to add daily AQI information and a air quality forecast to their weather announcement.
- DEQ is collaborating with EPA on the wintertime mountain valley study. Planning is underway to install a ceilometer to measure cloud height during winter inversions starting in the first quarter of 2021.
- A statewide communications campaign focusing on dry wood started in 2020. DEQ will conduct surveys to gain further knowledge on local burning habits and to explore how best to remove barriers preventing the exclusive use of dry firewood. DEQ is partnering with the BLM and USFS to provide educational materials with the firewood permits issued by these agencies, including the importance of using dry firewood, how to season firewood, and how to use a moisture meter.