

Portola PM2.5 Second Quantitative Milestone Report

Northern Sierra Air Quality Management District

January 9, 2023

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BACKGROUND

On January 15, 2015, the United States Environmental Protection Agency (U.S. EPA) designated and classified a portion of Plumas County as a Moderate PM_{2.5} nonattainment area (Portola Nonattainment Area) for the 2012 12.0 µg/m³ annual PM_{2.5} National Ambient Air Quality Standards (NAAQS) (12.0 µg/m³ PM_{2.5} NAAQS). This was based on ambient monitoring data that showed the area was above 12.0 µg/m³ for the 2011–2013 monitoring period.¹

Burning wood for residential heating is a dominant source of PM_{2.5} in the Portola Nonattainment Area. In 2016, the Northern Sierra Air Quality Management District (District) launched the Greater Portola Wood Stove Change-out Program (Program) funded primarily by the U.S. EPA Targeted Airshed Grants. As part of this Program, over 400 households replaced old wood heaters with modern, low-polluting, and energy efficient alternatives.

On February 28, 2017, the California Air Resources Board (CARB) submitted to U.S. EPA the Portola Fine Particulate Matter (PM_{2.5}) Attainment Plan (Portola Plan) developed by the District. The Portola Plan projected that the Portola Nonattainment Area would reach attainment of the 12.0 µg/m³ PM_{2.5} NAAQS by the Moderate area deadline of December 31, 2021. Despite achieving the emission reduction goals established in the Portola Plan, the Portola Nonattainment Area did not meet the 12.0 µg/m³ PM_{2.5} NAAQS by the Moderate attainment deadline of December 31, 2021. Between 2016, the beginning of the Program implementation, and 2021, the annual PM_{2.5} design value decreased 17 percent with the 2021 PM_{2.5} design value still 3 percent and 9 above the 12.0 µg/m³ PM_{2.5} NAAQS.

Section 189(c) of the Clean Air Act (CAA) requires that attainment plans for all PM_{2.5} nonattainment areas contain quantitative milestones that are achieved every three years and demonstrate reasonable further progress (RFP) until the area is redesignated to attainment. These milestones are set to ensure that the nonattainment area is making generally linear progress towards attainment and is on track to attain the NAAQS by the applicable attainment date.

In the case of the Portola Nonattainment Area, the first quantitative milestone date was October 2019. Section 189(c)(2) of the CAA requires each state containing a PM_{2.5} nonattainment area to submit, no later than 90 days after the applicable milestone date, a quantitative milestone report demonstrating that all State Implementation Plan (SIP) measures have been implemented and that the milestone has been met. The first quantitative milestone report for the Portola Nonattainment Area was submitted early on May 15, 2019. The second quantitative milestone report is due in January 2023.

¹ 40 CFR 81 (Jan 15, 2015)

Each quantitative milestone report must include, at a minimum:

- A certification by the Governor or Governor’s designee that the SIP control strategy is being implemented consistent with RFP;
- Technical support, including calculations, sufficient to document completion statistics for appropriate milestones and to demonstrate that the quantitative milestones have been satisfied and how the emission reductions achieved to date compare to those required or scheduled to meet RFP; and
- A discussion of whether the area will attain the applicable PM2.5 NAAQS by the projected attainment date.²

The U.S. EPA requires that the RFP demonstration for milestone years includes direct PM2.5, as well as any PM precursors that have been determined to be significant. As demonstrated in Section V.C of the Portola Plan, PM precursors were determined to be insignificant for attainment. Therefore, this report only addresses direct PM2.5 emissions.

The objective of this quantitative milestone report is to demonstrate that the District has reviewed its commitments in the Portola Plan, has verified that the emission reductions needed to demonstrate RFP have been achieved, and to acknowledge that despite the ongoing progress, the Portola Nonattainment Area failed to meet the December 31, 2021 attainment deadline.

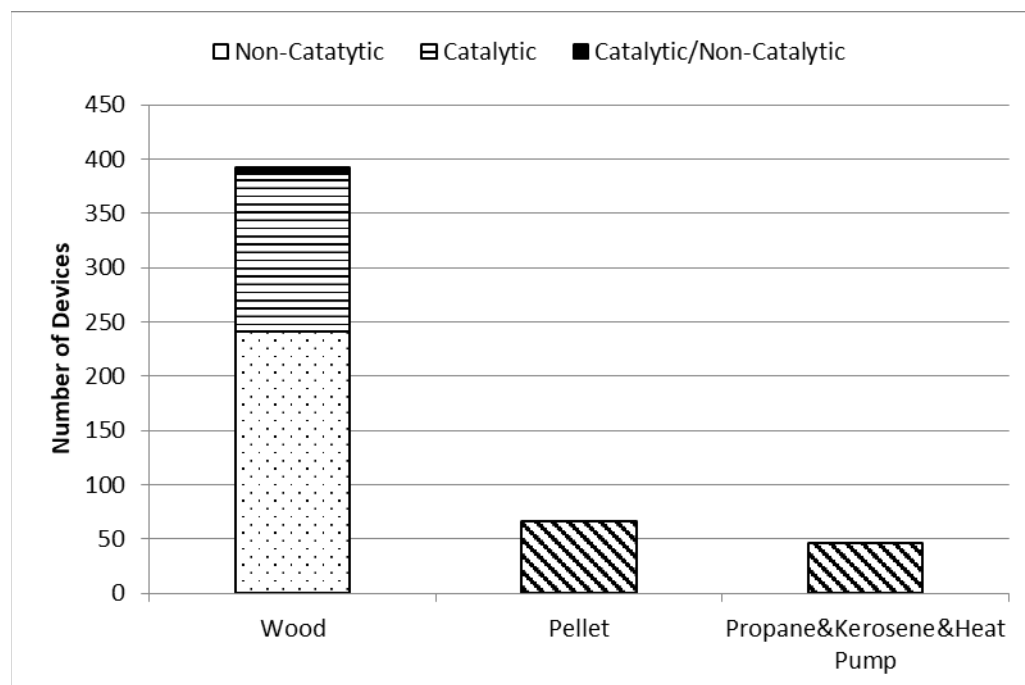
I. CONTROL STRATEGY IMPLEMENTATION

PM2.5 concentrations in the Portola Nonattainment Area are dominated by direct PM2.5 emissions from residential wood heaters. Having a single emission source category that is located in people’s homes and used as a primary source of heat makes the Portola Nonattainment Area PM2.5 problem very challenging. Therefore, the District and CARB chose to implement a Greater Portola Woodstove Change-out Program (Change-out Program) as the primary control strategy for the Portola Nonattainment Area. The District and CARB have committed to implementing the Change-out Program and continuing the ongoing reductions in the mobile sector to achieve milestone and attainment obligations. These commitments have been satisfied. The District made additional commitments listed in Table 4 of the Portola Plan referred to as ‘Other Commitments’. Any potential emission reductions achieved from the ‘Other Commitments’ were not part of the attainment demonstration. The District has met all of these commitments.

The Portola Plan 2022 quantitative milestone target assumed that between 2016 and 2022, 600 uncertified stoves will be replaced with Phase II certified stoves with an average tested emission rate of 7.5 grams/hour (g/hr). The actual change-outs include 393 wood stoves with average emission rates of 2.4 g/hr, 67 pellet stoves with an average emission rate of 1.3 g/hr, 39 propane or kerosene stoves, and 7 heat pumps. Figure 1 illustrates the devices replaced through October 18, 2022, grouped by the device type.

² 40 CFR 51.1013(b)

Figure 1. Number of Replacement Devices by Type Installed through 10/18/2022



II. EMISSION REDUCTIONS

The District made a commitment to achieve PM2.5 emission reductions of 0.045 tons per day (tpd) by the October 2019 milestone and 0.077 tpd by the October 2022 milestone by replacing uncertified wood stoves with cleaner burning and more efficient home heating devices in the Portola Nonattainment Area (Table 1).

Table 1. RFP Projected Emissions for Quantitative Milestone Years (tpd)

Sector	2019	2022
Wood Stove Change-out	0.045	0.077
Total	0.045	0.077

As illustrated in Table 2 and Appendix A, change-outs completed by October 18, 2022, are estimated to reduce PM2.5 emissions by 0.091 tpd by the October 2022 milestone. The emission reductions needed to demonstrate RFP in both, 2019 and 2022, have been exceeded, the October 2022 quantitative milestone has been met. Despite exceeding the 2022 emission reduction goal by over 18 percent, the Portola Nonattainment Area failed to meet the 12.0 $\mu\text{g}/\text{m}^3$ PM2.5 NAAQS by the December 31, 2021 attainment deadline.

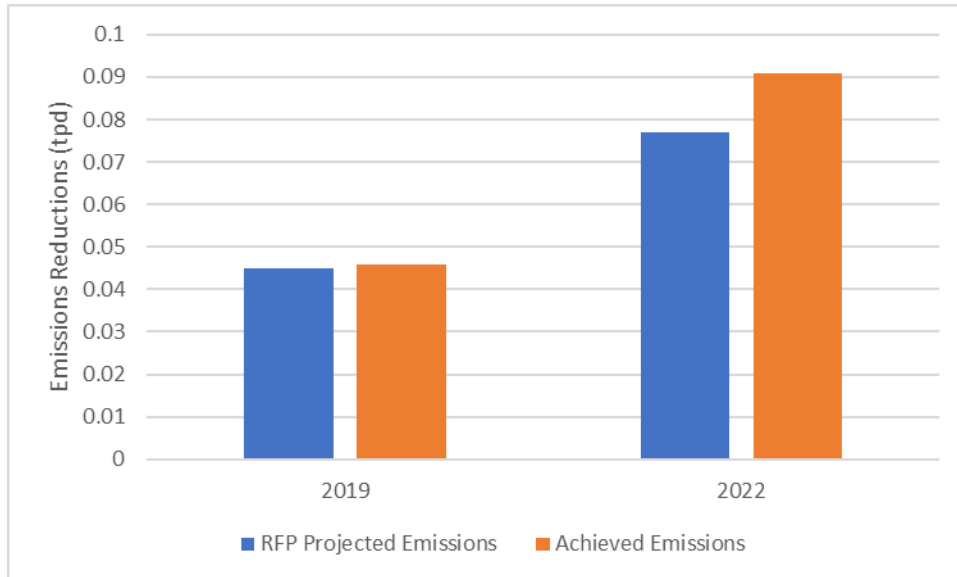
The 506 devices installed by October 18, 2022, provide the emission reductions needed to meet the 2022 RFP milestone because they have significantly lower PM2.5 emission rates than the initial estimates. In order to have a conservative estimate, the

Portola Plan attainment demonstration assumed that each qualified uncertified device will be replaced with a Phase II wood stove with an average certification test emission rate of 7.5 g/hr. The 393 wood-burning replacement devices installed between 2016 and October 18, 2022, had an average certification test emission rate of 2.4 g/hr. The remaining 113 devices were even cleaner and included 67 pellet stoves with average emission rates of 1.3 g/hr and 46 non wood heating devices (propane, kerosene, or electric) with negligible PM2.5 emissions. The change-out statistics through October 18, 2022, including the number of specific devices and associated emission reductions are summarized in Table 2. Figure 2 compares the achieved emission reductions to the 2019 and 2022 quantitative milestones.

Table 2. Summary of Change-outs Completed between 2016 and October 18, 2022

Total Installations as of 10/18/2022	506
Summary by Replacement Device Type	
Non-catalytic Stoves	241
Catalytic Stoves	145
Hybrid Stoves	7
Pellet Stoves	67
Propane or Kerosene Stoves	39
Heat Pumps	7
Summary of Emission Reductions	
Total PM2.5 Emissions Saved (tons per year)	33.268
Total PM2.5 Emissions Saved (tpd)	0.091
SIP Commitment (tpd)	0.077
Additional PM2.5 Reductions Achieved (tpd)	0.014

Figure 2. Comparison of PM2.5 RFP Projected Emission Reductions to Achieved for the 2019 and 2022 Quantitative Milestones.



III. CALCULATIONS

Initial estimates of emission reductions achieved by replacing uncertified wood stoves with cleaner burning and more energy efficient home heating devices were based on U.S. EPA Burnwise Emission Calculator (EPA Calculator).³ The U.S. EPA Calculator is designed to calculate the average emission reductions for the entire Program using the default emission factors. In order to come up with device specific emission estimates, CARB staff developed a supplemental calculator, referred to as the CARB Calculator.

The CARB Calculator was used to estimate PM2.5 emission reductions achieved by replacing 506 wood stoves between by October 18, 2022 with cleaner-burning and more energy efficient alternatives. The individual calculations for each device, along with the device tracking number and new equipment type, are presented in Appendix A. Listed below are the step-by-step instructions and formulas.

The first step in calculating emission reductions required converting certification test emission rates in grams per hour (g/hr) to emission factors in pounds per ton (lb/ton), as described below:

1. The certification test emission rate was scaled upward by 50 percent to reflect real-world in-home performance;⁴

³ Available at <https://www.epa.gov/burnwise/burn-wise-additional-resources>

⁴ <https://www3.epa.gov/ttnchie1/conference/ei17/session4/houck.pdf>

2. The scaled emission rate was divided by the average burn rate of 1.5 kilograms per hour (kg/hr) to calculate grams of PM2.5 emissions per kilogram of wood (g/kg);⁵ and
3. The result was multiplied by 2 to convert g/kg to lb/ton.

The average certification test emission rate for the 393 devices between 2016 and 2022 was 2.4 g/hr. Table 3 provides additional information about the emission limits of the wood burning devices installed by October 18, 2022.

Table 3. Breakdown of Wood Burning Devices Installed between 2016 to October 18, 2022 by the Emission Rate

Certification Test Emission Rate	Number of Devices
Not exceeding 3.0 g/hr	209
Between 3.0 g/hr and 4.0 g/hr	142
Greater than 4.0 g/hr	41
Total	393

The following equation was used to calculate emission factor in pounds per ton:

$$\text{Equation 1: } EF = (ER \times 1.5) / BR \times 2$$

Where:

- EF* Emission factor in pounds per ton
- ER* Emission rate in grams per hour
- BR* Average burn rate in kilograms per hour of operation
- 1.5 Factor used to scale certification test emission rate to reflect real world emissions
- 2 Factor used to convert grams per kilogram to pounds per ton

The average emission factor of 4.9 lb/ton calculated using Equation 1 is almost half of the emission factor of 8.76 lb/ton estimated in the Regulatory Impact Analysis for Residential Wood Heaters NSPS Review Table 4.3 (NSPS Review).⁶ Considering that the average replacement device had an approximate 50 percent lower certification test emission rate than the 4.5 g/hr assumed in the NSPS Review, the calculated emission factors seem appropriate.

⁵ Based on information received from Gary Blais of U.S. EPA Burnwise Program on August 2, 2016, titled "Conversion Factor TB." The spreadsheet was prepared by Tom Butcher, Research Engineer; Brookhaven National Laboratory.

⁶ https://www3.epa.gov/ttnecas1/docs/ria/wood-heaters_ria_final-nsps-revision_2015-02.pdf

The following formulas were used to calculate PM2.5 emissions of the old device, the new device, and the difference between them.

$$\text{Equation 2: } E_{old} = (EF_{old} \times WU \times WD)/2000$$

$$\text{Equation 3: } E_{new} = (EF_{new} \times WU \times WD \times (EFC_{old}/EFC_{new}))/2000$$

$$\text{Equation 4: } E_{benefit} = E_{old} - E_{new}$$

Where:

E_{old}	Emissions of old device (ton/year)
E_{new}	Emissions of new device (ton/year)
EF_{old}	Emission factor for the old device (lb/ton)
EF_{new}	Emission factor for the new device (lb/ton)
WU	Wood usage (cords/year)
WD	Wood density (ton/cord)
EFC_{old}	Device efficiency for the old device (%)
EFC_{new}	Device efficiency for the new device (%)
$E_{benefit}$	Emission reductions from change-out (ton/year)

Since emission factors for pellet stoves are considered to be more representative of actual in-home usage,⁷ a default emission factor of 3.06 lb/ton, consistent with the NSPS Review, was used for all pellet stoves.⁸ Portola households using a pellet stove as a main source of heat use two to three tons of pellet fuel per year.⁹ In order to ensure a conservative estimate for emission reductions, three tons was assumed. Consistent with California’s Short-Lived Climate Pollutant Reduction Strategy¹⁰, propane and kerosene fueled heating devices were assumed to have negligible PM2.5 emissions.

IV. AIR QUALITY PROGRESS

Between 2016, the beginning of the Program implementation, and 2021, the annual and the 24-hr PM2.5 design values decreased 17 and 24 percent, respectively. Measured and modeled PM2.5 design values since the beginning of the Program are compared in Figures 3 (annual) and Figure 4 (24-hr). 2021 PM2.5 design values were 3 percent (Figure 3) and 9 percent (Figure 4) above the annual and 24-hr PM2.5 NAAQS, respectively. Despite being very near the 12.0 µg/m³ PM2.5 NAAQS, several variables may have contributed to slow the progress and contribute to failing to attain the 12.0 µg/m³ PM2.5 NAAQS by the December 31, 2021 attainment deadline.

⁷ <https://www3.epa.gov/ttnchie1/ap42/ch01/related/woodstove.pdf>

⁸ https://www3.epa.gov/ttnecas1/docs/ria/wood-heaters_ria_final-nsps-revision_2015-02.pdf.

⁹ Quincy Hot Spot personal communication

¹⁰ https://www.arb.ca.gov/cc/shortlived/meetings/03142017/final_slcp_report.pdf

Figure 3. Comparison of Measured Annual Design Values to Modeled¹¹

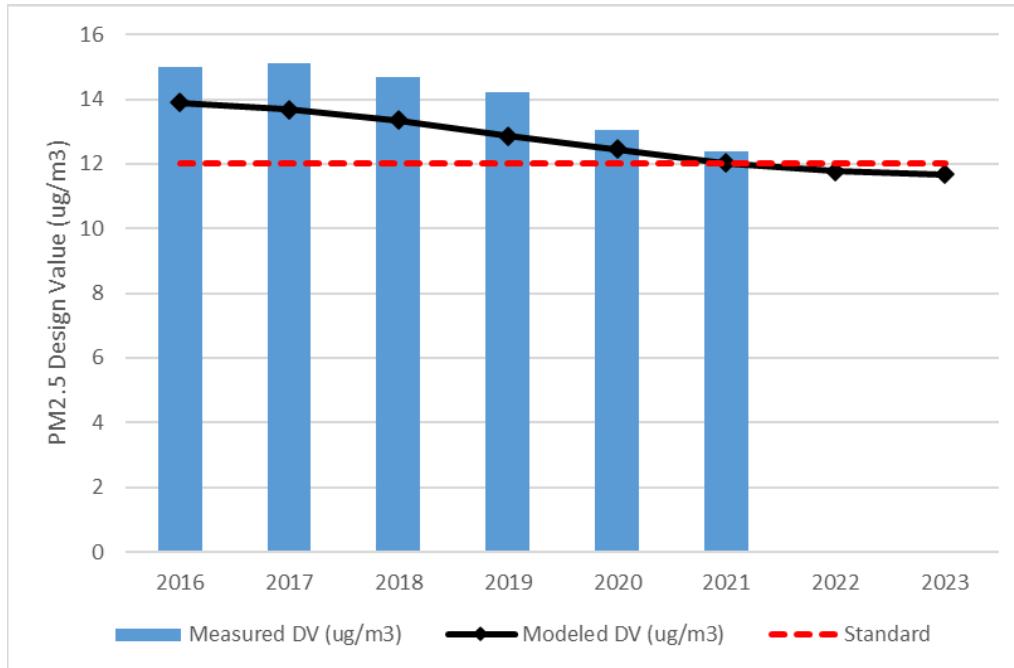
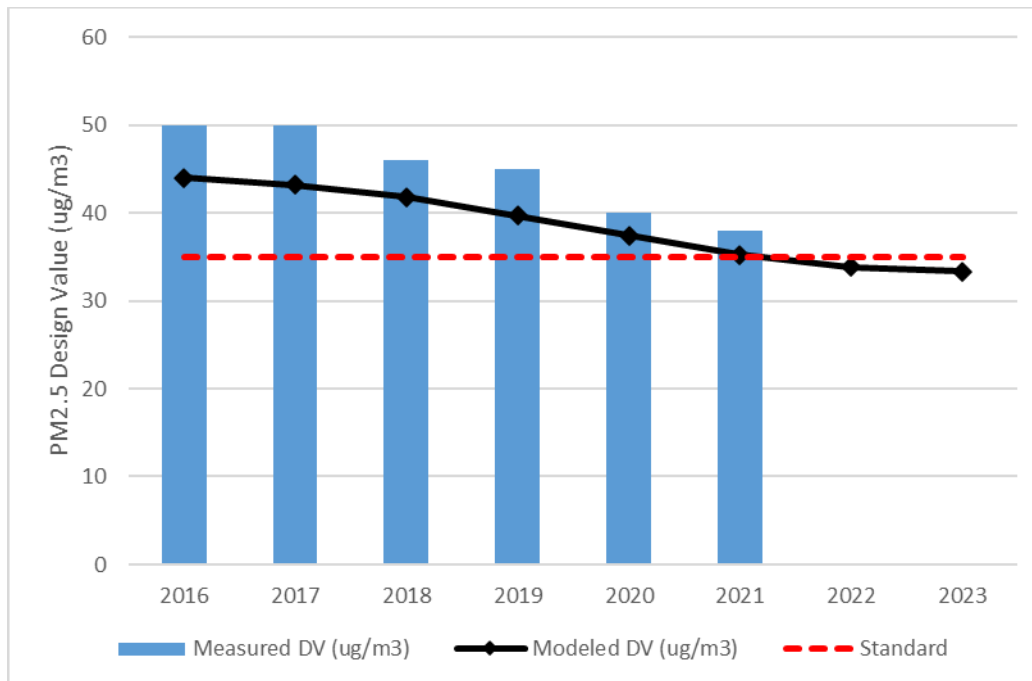


Figure 4. Comparison of Measured 24-hr Design Values to Modeled¹²



The new U.S. EPA certified wood stoves installed in the Portola Nonattainment Area may not have been as low emitting as the certification values indicated. The U.S. EPA is responsible for certifying wood burning devices to ensure they meet the NSPS.

¹¹ Based on data downloaded from U.S. EPA Air Quality System 2/20/2022. Data influenced by 2020 and 2021 wildfires were excluded from the design value calculations.

¹² *ibid.*

Recent work done by the Northeast States for Coordinated Air Use Management (NESCAUM) revealed significant problems with the U.S. EPA wood stove certification program. The program allows testing to be directed by manufacturers and testing laboratories to achieve desired results below NSPS certification values. Tests conducted by NESCAUM revealed emissions significantly above the reported certification levels. In response to these concerns, the U.S. EPA Office of Inspector General is conducting an internal investigation of the wood stove certification program.

Effective February 23, 2022, U.S. EPA revoked the two alternative test methods commonly used to certify wood stoves to NSPS standards, ALT-125 and ALT-127. By allowing significant flexibility in these testing protocols, the methods made it easier for manufacturers to meet NSPS emission limits without changing the wood stove design. Since the replacement wood stove certification values are used as the basis for modeling future air quality, the improvement in air quality would fall short of projections if replacement wood stoves do not perform in accordance with their certification values. The U.S. EPA wood stove certification program in its current framework lacks the integrity needed to ensure that new residential wood stoves provide health benefits by meeting NSPS emission standards. This is especially critical considering the recent recommendation by the Clean Air Scientific Advisory Committee to lower both the 24-hour and annual PM_{2.5} NAAQS levels.

The other two variables important for the overall success of a woodstove change-out program are user education on optimal device operation and the use of properly seasoned wood. However, for these two variables to make a significant impact, the device must still be able to perform in a manner consistent with the certification values.

Operator usage contributes greatly to the success of achieving emission reductions from wood-to-wood replacement. To ensure optimal emission reductions, District made outreach and education a top priority. All Program participants are trained in the use of their new wood stove at the time of installation. In addition to manufacturer operation manuals, installers provide Program participants with District-developed literature addressing operations, maintenance, and fuel quality and dimensions. The Covid-19 pandemic negatively impacted the implementation of the wood stove change-out program and the air quality progress. Social distancing restrictions prevented District from holding the outreach and education events and limited new installations by restricting in-home visits. Furthermore, remote work and study increased the demand for home heating. The in-home follow-up visits by District staff were discontinued during the pandemic, but with the easing of social distancing restrictions, the District will renew follow-up visits. To enhance outreach, the District engaged with outside consultants to develop a new education campaign designed to address the health impacts of exposure to wood smoke.

PM_{2.5} pollution from certified wood stoves, even under optimal operating conditions, is still much higher than pollution from other heat sources. Therefore, the District is working to maximize the number of non-wood replacements. The reductions achieved

by replacing a wood burning device with a non-wood burning device are more certain as emissions are less influenced by fuel quality, operator error, and lack of regular maintenance. In addition to offering higher incentives for switching to non-wood home heating, starting in March of 2022, removal of a wood-burning device will not be required for a household to qualify for a heat pump installation. This should significantly increase the number of households interested in switching their primary source of heat to a heat pump because it will alleviate concerns about ability to heat their homes during a power outage. This new provision will apply only to households residing in the City of Portola where the population is denser than the surrounding areas and the residents are subject to the City's mandatory woodburning curtailment program.

V. SUMMARY AND CONCLUSIONS

The Portola Nonattainment Area is classified as Moderate nonattainment for the 12.0 $\mu\text{g}/\text{m}^3$ PM_{2.5} NAAQS with an attainment date of December 31, 2021.

The District has reviewed its commitments in the Portola Plan, has provided updates on the implementation of the control measures, and has verified that the emission reductions needed to satisfy the 2022 milestone have been achieved. Despite achieving the emission reductions needed to demonstrate RFP and meeting the 2022 quantitative milestone, the Portola Nonattainment Area had failed to attain the 12.0 $\mu\text{g}/\text{m}^3$ PM_{2.5} NAAQS by December 31, 2021 with 2021 PM_{2.5} design values three percent above the 12.0 $\mu\text{g}/\text{m}^3$ PM_{2.5} NAAQS.

On November 1, 2022, U.S. EPA proposed to find that the Portola Nonattainment Area failed to meet the 12.0 $\mu\text{g}/\text{m}^3$ PM_{2.5} NAAQS by the Moderate attainment deadline of December 31, 2021 and proposed that the area be bumped up to Serious¹³. The emission reductions from the woodstove change-out program were estimated to reduce PM_{2.5} below the 12.0 $\mu\text{g}/\text{m}^3$ PM_{2.5} NAAQS, but the air quality progress fell three percent short of expectations. As demonstrated by the NESCAUM review, the U.S. EPA wood heater certification program lacks the integrity necessary to ensure that the replacement devices, when operated according to manufacture instructions, deliver reductions consistent with U.S. EPA-tested certification values. Since the replacement devices were not as clean as the certification values implied, the improvement in air quality fell short of expectations. Going forward, the District is working to increase the number of non-wood replacements in the Nonattainment Area to reduce reliance on emission reductions from wood-based heating devices.

Since June 2022, full-time and two part-time staff members have been assigned to oversee Targeted Air Shed grant functions. Due to this increase in staffing levels, several Program elements have been reestablished and new marketing campaigns have been incorporated. Some of the newly implemented elements include electric mini split heat pump installations, video advertisement marketing campaigns, in-person events, in-home assessments, and the importance of improved woodstove

¹³ [2022-23344.pdf \(govinfo.gov\)](#)

emissions and air quality impacts with Portola residents. The Program has responded to inflation concerns with an increase in the amount allocated to individual change outs and vouchers paid out by the District. In addition to the implemented program elements, the District has contracted with an outside agency to issue daily forecasts for wood stove curtailment days. Curtailment days are sent to the public via email and on the District website. The District strongly believes with time and U.S. EPA grant funds that PM2.5 emissions will continue to reduce in the greater Portola area providing improved PM2.5 air quality.

Appendix A

Greater Portola Wood Stove Change-out Program Emission Benefit Calculator

Constants & Conversions	Value	Unit	Source
PM2.5 Emission Factors			
Uncertified Stove	30.60	lb PM2.5/ton wood	AP-42, Table 1.10.-1 ¹
Fireplace	34.60	lb PM2.5/ton wood	AP-42, Table 1.9.-1 ²
Pellet Stove	3.06	lb PM2.5/ton wood	2015 NSPS - Regulatory Impact Analysis for Residential Wood Heaters NSPS Review Table 4.3 ³
2015 NSPS Stove	8.76	lb PM2.5/ton wood	2015 NSPS - Regulatory Impact Analysis for Residential Wood Heaters NSPS Review Table 4.3 ⁴
Propane, Electric, or Kerosene	0.00		California Short-Lived Pollutant Reduction Strategy ⁵
Efficiency			
Uncertified Stove Efficiency	54	%	AP-42, Table 1.10-5 ⁶
Certified Stove Efficiency	68	%	AP-42, Table 1.10-5 ⁷
Pellet Stove Efficiency	68	%	AP-42, Table 1.10-5 ⁸
Fireplace	7	%	Review of Fireplace Use and Technology, OMNI Environmental ⁹
Other Constants & Conversions			
Wood Use	4.3	cord/year	District Survey
Wood Density	1.04	ton/cord	U.S. EPA Burnwise Emission Calculator
Average Burn Rate	1.5	kg/hour	Gary Blais Personal Communications
Emission Rate Scaling Factor	1.5		
Conversion from lb to ton	2000		
Conversion from g/kg to lb/ton	2		

¹ <https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s10.pdf>

² <https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s09.pdf>

³ https://www3.epa.gov/ttnecas1/docs/ria/wood-heaters_ria_final-nsps-revision_2015-02.pdf

⁴ Ibid

⁵ https://www.arb.ca.gov/cc/shortlived/meetings/03142017/final_slcp_report.pdf

⁶ <https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s10.pdf>

⁷ Ibid

⁸ Ibid

⁹ <http://www.omni-test.com/publications/firepl.pdf>

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2016-001	wood	NC	5/23/16	2.9	5.8	0.0684	0.0103	0.0581
2016-003	wood	NC	8/9/16	1.9	3.8	0.0684	0.0067	0.0617
2016-006	wood	NC	5/11/16	3.5	7	0.0684	0.0124	0.0560
2016-007	wood	NC	8/5/16	3.3	6.6	0.0684	0.0117	0.0567
2016-008	wood	NC	6/24/16	0.58	1.16	0.0684	0.0021	0.0664
2016-009	wood	NC	5/10/16	3.2	6.4	0.0684	0.0114	0.0571
2016-011	wood	NC	5/27/16	3.8	7.6	0.0684	0.0135	0.0549
2016-012	wood	NC	5/19/16	3.09	6.18	0.0684	0.0110	0.0574
2016-015	wood	NC	5/11/16	3.2	6.4	0.0684	0.0114	0.0571
2016-016	wood	NC	8/4/16	3	6	0.0684	0.0107	0.0578
2016-017	wood	NC	7/14/16	3.5	7	0.0684	0.0124	0.0560
2016-019	wood	NC	6/13/16	2.3	4.6	0.0684	0.0082	0.0603
2016-020	wood	NC	6/23/16	4.4	8.8	0.0684	0.0156	0.0528
2016-021	wood	NC	5/25/16	3.8	7.6	0.0684	0.0135	0.0549
2016-022	wood	NC	8/18/16	3.6	7.2	0.0684	0.0128	0.0556
2016-023	wood	NC	6/28/16	2.77	5.54	0.0684	0.0098	0.0586
2016-024	wood	NC	5/19/16	2.4	4.8	0.0684	0.0085	0.0599
2016-025	wood	NC	7/14/16	3.5	7	0.0684	0.0124	0.0560
2016-026	wood	NC	9/1/16	0.08	0.16	0.0684	0.0003	0.0681
2016-028	wood	NC	5/16/16	3.5	7	0.0684	0.0124	0.0560
2016-029	wood	NC	6/21/16	4.4	8.8	0.0684	0.0156	0.0528
2016-030	wood	NC	10/19/16	3.9	7.8	0.0684	0.0139	0.0546
2016-032	wood	NC	7/25/16	4.4	8.8	0.0684	0.0156	0.0528
2016-033	wood	NC	8/2/16	3.2	6.4	0.0684	0.0114	0.0571
2016-035	wood	NC	7/8/16	2.9	5.8	0.0684	0.0103	0.0581
2016-036	wood	NC	6/22/16	3.8	7.6	0.0684	0.0135	0.0549
2016-037	wood	NC	10/11/16	4.2	8.4	0.0684	0.0149	0.0535
2016-038	wood	NC	6/23/16	3.2	6.4	0.0684	0.0114	0.0571
2016-039	wood	NC	7/26/16	3.5	7	0.0684	0.0124	0.0560
2016-040	wood	NC	7/19/16	3.6	7.2	0.0684	0.0128	0.0556
2016-041	wood	NC	7/8/16	4.1	8.2	0.0684	0.0146	0.0539
2016-042	wood	NC	6/14/16	2.7	5.4	0.0684	0.0096	0.0588
2016-044	wood	NC	7/14/16	3.8	7.6	0.0684	0.0135	0.0549
2016-045	wood	NC	7/12/16	4.4	8.8	0.0684	0.0156	0.0528
2016-046	wood	NC	7/28/16	2.1	4.2	0.0684	0.0075	0.0610
2016-047	wood	NC	7/22/16	3.2	6.4	0.0684	0.0114	0.0571
2016-048	wood	NC	12/5/16	3.6	7.2	0.0684	0.0128	0.0556
2016-049	wood	NC	8/3/16	3.5	7	0.0684	0.0124	0.0560
2016-050	wood	NC	7/11/17	2.1	4.2	0.0684	0.0075	0.0610
2016-051	wood	NC	7/26/16	3.2	6.4	0.0684	0.0114	0.0571
2016-054	wood	NC	8/17/16	2.3	4.6	0.0684	0.0082	0.0603
2016-055	wood	NC	9/14/16	3.6	7.2	0.0684	0.0128	0.0556
2016-056	wood	NC	8/26/16	3.1	6.2	0.0684	0.0110	0.0574
2016-057	wood	NC	12/16/16	3.5	7	0.0684	0.0124	0.0560
2016-058	wood	NC	7/29/16	3	6	0.0684	0.0107	0.0578

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2016-059	wood	NC	8/19/16	2.3	4.6	0.0684	0.0082	0.0603
2016-061	wood	NC	8/12/16	3.9	7.8	0.0684	0.0139	0.0546
2016-062	wood	NC	8/9/16	3.8	7.6	0.0684	0.0135	0.0549
2016-064	wood	NC	8/2/16	3	6	0.0684	0.0107	0.0578
2016-065	wood	NC	8/17/16	3.6	7.2	0.0684	0.0128	0.0556
2016-066	wood	NC	12/20/16	3.9	7.8	0.0684	0.0139	0.0546
2016-068	wood	NC	9/15/16	2.3	4.6	0.0684	0.0082	0.0603
2016-069	wood	NC	9/14/16	3.7	7.4	0.0684	0.0131	0.0553
2016-070	wood	NC	11/18/16	3.2	6.4	0.0684	0.0114	0.0571
2016-072	wood	NC	9/9/16	3.9	7.8	0.0684	0.0139	0.0546
2016-073	wood	NC	4/19/18	3.29	6.58	0.0684	0.0117	0.0567
2016-074	wood	NC	8/9/16	2.1	4.2	0.0684	0.0075	0.0610
2016-075	wood	NC	11/3/16	4.47	8.94	0.0684	0.0159	0.0525
2016-076	wood	NC	9/7/16	3.8	7.6	0.0684	0.0135	0.0549
2016-078	wood	NC	10/13/16	3.5	7	0.0684	0.0124	0.0560
2016-079	wood	NC	8/18/16	3.8	7.6	0.0684	0.0135	0.0549
2016-080	wood	NC	6/27/17	1.9	3.8	0.0684	0.0067	0.0617
2016-082	wood	NC	9/9/16	3.5	7	0.0684	0.0124	0.0560
2016-083	wood	NC	10/11/16	3.5	7	0.0684	0.0124	0.0560
2016-084	wood	NC	9/13/16	3.7	7.4	0.0684	0.0131	0.0553
2016-085	wood	NC	10/19/16	3.5	7	0.0684	0.0124	0.0560
2016-089	wood	NC	9/8/16	3	6	0.0684	0.0107	0.0578
2016-091	wood	NC	10/6/16	3	6	0.0684	0.0107	0.0578
2016-093	wood	NC	12/1/16	3.5	7	0.0684	0.0124	0.0560
2016-096	wood	NC	10/18/16	4.4	8.8	0.0684	0.0156	0.0528
2016-098	wood	NC	11/18/16	3.2	6.4	0.0684	0.0114	0.0571
2016-099	wood	NC	5/17/17	4.2	8.4	0.0684	0.0149	0.0535
2016-101	wood	NC	10/10/16	4.4	8.8	0.0684	0.0156	0.0528
2016-103	wood	NC	10/12/16	4.4	8.8	0.0684	0.0156	0.0528
2016-104	wood	NC	11/22/16	3.2	6.4	0.0684	0.0114	0.0571
2016-106	wood	NC	10/21/16	3.5	7	0.0684	0.0124	0.0560
2016-107	wood	NC	2/24/17	1.9	3.8	0.0684	0.0067	0.0617
2016-108	wood	NC	8/18/17	3.5	7	0.0684	0.0124	0.0560
2016-109	wood	NC	12/7/16	3.1	6.2	0.0684	0.0110	0.0574
2016-111	wood	NC	11/3/16	4.2	8.4	0.0684	0.0149	0.0535
2016-112	wood	NC	11/21/16	3.9	7.8	0.0684	0.0139	0.0546
2016-113	wood	NC	11/17/16	3	6	0.0684	0.0107	0.0578
2016-115	wood	NC	10/17/16	4.4	8.8	0.0684	0.0156	0.0528
2016-118	wood	NC	10/31/16	3.89	7.78	0.0684	0.0138	0.0546
2016-120	wood	NC	12/20/16	4.4	8.8	0.0684	0.0156	0.0528
2016-121	wood	NC	11/8/16	4.4	8.8	0.0684	0.0156	0.0528
2016-122	wood	NC	11/16/16	4.4	8.8	0.0684	0.0156	0.0528
2016-123	wood	NC	12/16/16	3.5	7	0.0684	0.0124	0.0560
2016-126	wood	NC	1/27/17	3.5	7	0.0684	0.0124	0.0560
2016-127	wood	NC	9/6/18	3.3	6.6	0.0684	0.0117	0.0567

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2016-128	wood	NC	12/19/16	4.47	8.94	0.0684	0.0159	0.0525
2016-129	wood	NC	6/14/17	3.8	7.6	0.0684	0.0135	0.0549
2016-131	wood	NC	11/7/17	3.5	7	0.0684	0.0124	0.0560
2016-132	wood	NC	12/12/16	4.4	8.8	0.0684	0.0156	0.0528
2016-133	wood	NC	12/7/16	3.5	7	0.0684	0.0124	0.0560
2016-134	wood	NC	12/7/16	4	8	0.0684	0.0142	0.0542
2016-135	wood	NC	7/14/17	3.8	7.6	0.0684	0.0135	0.0549
2016-136	wood	NC	12/15/16	3.2	6.4	0.0684	0.0114	0.0571
2016-137	wood	NC	12/20/16	2.3	4.6	0.0684	0.0082	0.0603
2016-138	wood	NC	1/27/17	3.6	7.2	0.0684	0.0128	0.0556
2016-139	wood	NC	1/24/17	3.2	6.4	0.0684	0.0114	0.0571
2016-140	wood	NC	12/16/19	3.9	7.8	0.0684	0.0139	0.0546
2016-145	wood	NC	3/16/17	3.5	7	0.0684	0.0124	0.0560
2016-146	wood	NC	6/20/17	3.5	7	0.0684	0.0124	0.0560
2016-147	wood	NC	3/30/17	3.5	7	0.0684	0.0124	0.0560
2016-148	wood	NC	12/28/16	2.8	5.6	0.0684	0.0099	0.0585
2016-149	wood	NC	1/31/17	3.5	7	0.0684	0.0124	0.0560
2016-150	wood	NC	8/3/17	3.5	7	0.0684	0.0124	0.0560
2016-151	wood	NC	7/6/17	3.59	7.18	0.0684	0.0127	0.0557
2017-001	wood	NC	5/21/17	3.2	6.4	0.0684	0.0114	0.0571
2017-002	wood	NC	8/9/18	3.4	6.8	0.0684	0.0121	0.0563
2017-003	wood	NC	3/9/17	3.9	7.8	0.0684	0.0139	0.0546
2017-155	wood	NC	5/26/17	4.4	8.8	0.0684	0.0156	0.0528
2017-156	wood	NC	5/10/17	3.2	6.4	0.0684	0.0114	0.0571
2017-157	wood	NC	3/27/17	3.2	6.4	0.0684	0.0114	0.0571
2017-159	wood	NC	3/31/17	3.2	6.4	0.0684	0.0114	0.0571
2017-161	wood	NC	4/12/17	1.9	3.8	0.0684	0.0067	0.0617
2017-163	wood	NC	9/5/17	4.2	8.4	0.0684	0.0149	0.0535
2017-164	wood	NC	5/25/17	3	6	0.0684	0.0107	0.0578
2017-165	wood	NC	5/20/17	3.2	6.4	0.0684	0.0114	0.0571
2017-166	wood	NC	6/30/17	0.8	1.6	0.0684	0.0028	0.0656
2017-168	wood	NC	5/19/17	2.3	4.6	0.0684	0.0082	0.0603
2017-169	wood	NC	6/28/17	3.09	6.18	0.0684	0.0110	0.0574
2017-170	wood	NC	9/12/18	3.29	6.58	0.0684	0.0117	0.0567
2017-171	wood	NC	6/7/17	3.8	7.6	0.0684	0.0135	0.0549
2017-172	wood	NC	6/13/17	3.8	7.6	0.0684	0.0135	0.0549
2017-173	wood	NC	7/14/17	3.59	7.18	0.0684	0.0127	0.0557
2017-174	wood	NC	8/22/17	3	6	0.0684	0.0107	0.0578
2017-177	wood	NC	7/17/17	3.4	6.8	0.0684	0.0121	0.0563
2017-179	wood	NC	9/4/18	3.8	7.6	0.0684	0.0135	0.0549
2017-182	wood	NC	8/7/17	2.9	5.8	0.0684	0.0103	0.0581
2017-183	wood	NC	8/24/17	4.29	8.58	0.0684	0.0152	0.0532
2017-184	wood	NC	10/12/17	4.4	8.8	0.0684	0.0156	0.0528
2017-187	wood	NC	7/25/17	3.89	7.78	0.0684	0.0138	0.0546
2017-188	wood	NC	8/23/17	1.9	3.8	0.0684	0.0067	0.0617

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2017-190	wood	NC	9/6/17	3.89	7.78	0.0684	0.0138	0.0546
2017-191	wood	NC	8/17/17	3.1	6.2	0.0684	0.0110	0.0574
2017-192	wood	NC	8/16/17	3.99	7.98	0.0684	0.0142	0.0543
2017-193	wood	NC	11/30/17	3.89	7.78	0.0684	0.0138	0.0546
2017-194	wood	NC	7/27/17	4.4	8.8	0.0684	0.0156	0.0528
2017-195	wood	NC	11/30/17	3.5	7	0.0684	0.0124	0.0560
2017-197	wood	NC	12/5/17	3.89	7.78	0.0684	0.0138	0.0546
2017-198	wood	NC	1/24/19	4.4	8.8	0.0684	0.0156	0.0528
2017-199	wood	NC	12/5/17	3.59	7.18	0.0684	0.0127	0.0557
2017-200	wood	NC	11/20/17	3.86	7.72	0.0684	0.0137	0.0547
2017-203	wood	NC	11/15/17	2.1	4.2	0.0684	0.0075	0.0610
2017-205	wood	NC	9/7/17	2.5	5	0.0684	0.0089	0.0595
2017-207	wood	NC	8/30/17	3.5	7	0.0684	0.0124	0.0560
2017-208	wood	NC	12/21/17	3.39	6.78	0.0684	0.0120	0.0564
2017-210	wood	NC	2/7/18	4.4	8.8	0.0684	0.0156	0.0528
2017-211	wood	NC	11/21/17	3.89	7.78	0.0684	0.0138	0.0546
2017-212	wood	NC	11/20/17	3.89	7.78	0.0684	0.0138	0.0546
2017-213	wood	NC	12/1/17	3.8	7.6	0.0684	0.0135	0.0549
2017-216	wood	NC	12/26/17	4.2	8.4	0.0684	0.0149	0.0535
2017-217	wood	NC	12/6/17	3.29	6.58	0.0684	0.0117	0.0567
2017-221	wood	NC	11/9/17	4.4	8.8	0.0684	0.0156	0.0528
2017-223	wood	NC	1/26/18	3.5	7	0.0684	0.0124	0.0560
2017-225	wood	NC	8/2/18	4.2	8.4	0.0684	0.0149	0.0535
2017-228	wood	NC	2/6/18	3.3	6.6	0.0684	0.0117	0.0567
2017-229	wood	NC	1/31/18	3.39	6.78	0.0684	0.0120	0.0564
2017-231	wood	NC	2/21/18	3.69	7.38	0.0684	0.0131	0.0553
2017-232	wood	NC	1/10/18	1.9	3.8	0.0684	0.0067	0.0617
2017-234	wood	NC	12/8/17	4.4	8.8	0.0684	0.0156	0.0528
2017-236	wood	NC	3/6/18	1.9	3.8	0.0684	0.0067	0.0617
2018-239	wood	NC	9/21/18	1.54	3.08	0.0684	0.0055	0.0630
2018-241	wood	NC	4/26/18	3.89	7.78	0.0684	0.0138	0.0546
2018-242	wood	NC	10/4/18	1.9	3.8	0.1080	0.0067	0.1012
2018-244	wood	NC	2/6/18	3.89	7.78	0.0684	0.0138	0.0546
2018-245	wood	NC	2/7/18	3.89	7.78	0.0684	0.0138	0.0546
2018-246	wood	NC	9/20/18	1.54	3.08	0.0684	0.0055	0.0630
2018-250	wood	NC	5/13/18	3.5	7	0.0684	0.0124	0.0560
2018-251	wood	NC	6/6/18	3.5	7	0.0684	0.0124	0.0560
2018-254	wood	NC	4/4/18	4.29	8.58	0.1080	0.0152	0.0927
2018-256	wood	NC	4/30/18	3.9	7.8	0.1080	0.0139	0.0941
2018-260	wood	NC	5/9/18	3.29	6.58	0.0684	0.0117	0.0567
2018-261	wood	NC	6/26/18	3.29	6.58	0.0684	0.0117	0.0567
2018-263	wood	NC	5/24/18	4.2	8.4	0.1080	0.0149	0.0930
2018-265	wood	NC	3/28/18	0.58	1.16	0.1080	0.0021	0.1059
2018-266	wood	NC	3/14/18	2.84	5.68	0.0684	0.0101	0.0583
2018-267	wood	NC	5/1/18	3.9	7.8	0.0684	0.0139	0.0546

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2018-270	wood	NC	3/19/18	3.9	7.8	0.0684	0.0139	0.0546
2018-271	wood	NC	6/4/18	3.89	7.78	0.0684	0.0138	0.0546
2018-272	wood	NC	8/31/18	3.5	7	0.1080	0.0124	0.0955
2018-273	wood	NC	5/18/18	3.29	6.58	0.0684	0.0117	0.0567
2018-276	wood	NC	9/12/18	1.1	2.2	0.0684	0.0039	0.0645
2018-278	wood	NC	5/8/18	4.29	8.58	0.0684	0.0152	0.0532
2018-280	wood	NC	10/10/18	3.5	7	0.0684	0.0124	0.0560
2018-282	wood	NC	8/3/18	2.69	5.38	0.0684	0.0096	0.0589
2018-287	wood	NC	3/29/19	3.2	6.4	0.0684	0.0114	0.0571
2018-289	wood	NC	9/5/18	3.59	7.18	0.0684	0.0127	0.0557
2018-290	wood	NC	9/21/18	3.29	6.58	0.0684	0.0117	0.0567
2018-292	wood	NC	10/25/18	1.9	3.8	0.0684	0.0067	0.0617
2018-293	wood	NC	12/7/18	3.29	6.58	0.1080	0.0117	0.0963
2018-297	wood	NC	10/3/18	1.9	3.8	0.0684	0.0067	0.0617
2018-298	wood	NC	11/1/18	3.5	7	0.0684	0.0124	0.0560
2018-299	wood	NC	11/1/18	3.2	6.4	0.0684	0.0114	0.0571
2018-301	wood	NC	10/2/18	3.9	7.8	0.0684	0.0139	0.0546
2018-310	wood	NC	11/13/19	3.2	6.4	0.0684	0.0114	0.0571
2018-312	wood	NC	3/21/19	3.59	7.18	0.0684	0.0127	0.0557
2018-314	wood	NC	10/12/18	2.3	4.6	0.1080	0.0082	0.0998
2018-315	wood	NC	11/26/18	1.9	3.8	0.1080	0.0067	0.1012
2018-320	wood	NC	12/6/18	1.54	3.08	0.0684	0.0055	0.0630
2018-323	wood	NC	12/5/19	3	6	0.0684	0.0107	0.0578
2018-324	wood	NC	1/8/19	1.9	3.8	0.0684	0.0067	0.0617
2018-327	wood	NC	3/13/19	3.5	7	0.0684	0.0124	0.0560
2018-328	wood	NC	3/5/19	1.99	3.98	0.0684	0.0071	0.0614
2019-331	wood	NC	5/7/19	4.29	8.58	0.0684	0.0152	0.0532
2019-332	wood	NC	10/3/19	4.29	8.58	0.0684	0.0152	0.0532
2019-333	wood	NC	9/10/19	3.29	6.58	0.0684	0.0117	0.0567
2019-335	wood	NC	4/11/19	3.9	7.8	0.0684	0.0139	0.0546
2019-340	wood	NC	6/6/19	4.29	8.58	0.1080	0.0152	0.0927
2019-342	wood	NC	6/20/19	3.3	6.6	0.1080	0.0117	0.0962
2019-345	wood	NC	5/30/19	1.9	3.8	0.0684	0.0067	0.0617
2019-348	wood	NC	10/14/19	1.9	3.8	0.1080	0.0067	0.1012
2019-349	wood	NC	7/26/19	4.29	8.58	0.0684	0.0152	0.0532
2019-359	wood	NC	10/30/19	1.49	2.98	0.0684	0.0053	0.0631
2019-360	wood	NC	5/13/19	3.7	7.4	0.0684	0.0131	0.0553
2019-361	wood	NC	6/4/19	3	6	0.0684	0.0107	0.0578
2019-362	wood	NC	11/20/19	3.29	6.58	0.0684	0.0117	0.0567
2019-366	wood	NC	10/2/19	4.29	8.58	0.0684	0.0152	0.0532
2019-367	wood	NC	7/11/19	4.29	8.58	0.0684	0.0152	0.0532
2019-369	wood	NC	8/29/19	3.39	6.78	0.1080	0.0120	0.0959
2019-371	wood	NC	5/22/19	3.7	7.4	0.0684	0.0131	0.0553
2019-375	wood	NC	6/13/19	2.6	5.2	0.0684	0.0092	0.0592
2019-376	wood	NC	10/9/19	0.8	1.6	0.0684	0.0028	0.0656

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2019-378	wood	NC	6/18/19	4.2	8.4	0.1080	0.0149	0.0930
2019-385	wood	NC	8/13/19	4.29	8.58	0.0684	0.0152	0.0532
2019-386	wood	NC	10/1/19	3.3	6.6	0.0684	0.0117	0.0567
2019-397	wood	NC	8/9/19	3.59	7.18	0.0684	0.0127	0.0557
2019-415	wood	NC	6/3/20	2.5	5	0.0684	0.0089	0.0595
2020-444	wood	NC	8/4/20	1.79	3.58	0.1080	0.0064	0.1016
2020-446	wood	NC	8/12/20	1.4	2.8	0.0684	0.0050	0.0634
2020-457	wood	NC	9/28/20	1.7	3.4	0.0684	0.0060	0.0624
2020-470	wood	NC	10/14/20	2.5	5	0.1080	0.0089	0.0991
2020-471	wood	nc	9/28/21	0.5	1	0.0684	0.0018	0.0666
2020-476	wood	NC	2/23/21	1.7	3.4	0.0684	0.0060	0.0624
2020-491	wood	NC	1/5/21	1.4	2.8	0.1080	0.0050	0.1030
2021-499	wood	NC	3/30/21	1.54	3.08	0.0684	0.0055	0.0630
2021-501	wood	NC	4/15/21	1.9	3.8	0.1080	0.0067	0.1012
2021-530	wood	NC	8/3/21	1.7	3.4	0.1080	0.0060	0.1019
2021-563	wood	NC	5/18/22	2	4	0.0684	0.0071	0.0613
2016-010	wood	CAT	11/1/17	1.76	3.52	0.0684	0.0063	0.0622
2016-018	wood	CAT	7/21/16	1.8	3.6	0.0684	0.0064	0.0620
2016-043	wood	CAT	8/16/16	1.48	2.96	0.0684	0.0053	0.0632
2016-067	wood	CAT	8/18/16	0.45	0.9	0.0684	0.0016	0.0668
2016-071	wood	CAT	8/17/16	0.45	0.9	0.0684	0.0016	0.0668
2016-086	wood	CAT	4/28/20	1.13	2.26	0.0684	0.0040	0.0644
2016-087	wood	CAT	10/5/16	2.42	4.84	0.0684	0.0086	0.0598
2016-090	wood	CAT	10/19/16	2.42	4.84	0.0684	0.0086	0.0598
2016-095	wood	CAT	9/22/16	1.76	3.52	0.0684	0.0063	0.0622
2016-102	wood	CAT	9/21/16	1.48	2.96	0.0684	0.0053	0.0632
2016-105	wood	CAT	11/16/16	1.3	2.6	0.0684	0.0046	0.0638
2016-130	wood	CAT	1/17/17	1.76	3.52	0.0684	0.0063	0.0622
2017-176	wood	CAT	6/21/17	2.4	4.8	0.0684	0.0085	0.0599
2017-178	wood	CAT	9/20/17	0.97	1.94	0.0684	0.0034	0.0650
2017-180	wood	CAT	4/20/21	1.13	2.26	0.0684	0.0040	0.0644
2017-189	wood	CAT	7/15/21	0.72	1.44	0.0684	0.0026	0.0659
2017-201	wood	CAT	8/17/17	3.8	7.6	0.0684	0.0135	0.0549
2017-209	wood	CAT	10/4/17	2.42	4.84	0.0684	0.0086	0.0598
2017-214	wood	CAT	11/14/17	0.045	0.09	0.0684	0.0002	0.0683
2017-215	wood	CAT	10/6/17	0.79	1.58	0.0684	0.0028	0.0656
2017-220	wood	CAT	10/31/17	0.35	0.7	0.0684	0.0012	0.0672
2017-227	wood	CAT	10/8/20	1.79	3.58	0.0684	0.0064	0.0621
2017-230	wood	CAT	3/13/18	2.42	4.84	0.0684	0.0086	0.0598
2018-243	wood	CAT	7/19/18	7.5	15	0.0684	0.0266	0.0418
2018-255	wood	CAT	4/23/18	0.09	0.18	0.0684	0.0003	0.0681
2018-258	wood	CAT	4/25/18	2.42	4.84	0.0684	0.0086	0.0598
2018-262	wood	CAT	9/25/18	2	4	0.0684	0.0071	0.0613
2018-264	wood	CAT	3/29/18	2.42	4.84	0.0684	0.0086	0.0598
2018-268	wood	CAT	8/16/18	1.76	3.52	0.0684	0.0063	0.0622

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2018-274	wood	CAT	8/8/18	1.3	2.6	0.0684	0.0046	0.0638
2018-277	wood	CAT	9/19/18	1.3	2.6	0.0684	0.0046	0.0638
2018-279	wood	CAT	6/18/18	1.3	2.6	0.0684	0.0046	0.0638
2018-284	wood	CAT	7/24/18	1.3	2.6	0.0684	0.0046	0.0638
2018-294	wood	CAT	7/16/18	1.3	2.6	0.0684	0.0046	0.0638
2018-300	wood	CAT	10/11/18	2.4	4.8	0.0684	0.0085	0.0599
2018-302	wood	CAT	9/18/18	2.2	4.4	0.0684	0.0078	0.0606
2018-304	wood	CAT	10/15/18	2.4	4.8	0.0684	0.0085	0.0599
2018-305	wood	CAT	10/22/18	2.42	4.84	0.0684	0.0086	0.0598
2018-308	wood	CAT	11/30/18	0.9	1.8	0.1080	0.0032	0.1048
2018-309	wood	CAT	11/5/18	2.4	4.8	0.0684	0.0085	0.0599
2018-313	wood	CAT	12/4/18	2.42	4.84	0.0684	0.0086	0.0598
2018-316	wood	CAT	12/4/18	1.3	2.6	0.0684	0.0046	0.0638
2018-318	wood	CAT	11/14/18	1.3	2.6	0.0684	0.0046	0.0638
2018-319	wood	CAT	10/19/20	0.7	1.4	0.0684	0.0025	0.0659
2018-322	wood	CAT	12/16/20	0.72	1.44	0.1080	0.0026	0.1054
2018-325	wood	CAT	2/19/19	0.8	1.6	0.0684	0.0028	0.0656
2018-326	wood	CAT	1/25/19	1.79	3.58	0.0684	0.0064	0.0621
2019-329	wood	CAT	2/12/19	2.59	5.18	0.0684	0.0092	0.0592
2019-338	wood	CAT	10/14/19	0.9	1.8	0.1080	0.0032	0.1048
2019-339	wood	CAT	8/7/19	1.3	2.6	0.0684	0.0046	0.0638
2019-344	wood	CAT	5/14/19	1.76	3.52	0.0684	0.0063	0.0622
2019-346	wood	CAT	7/9/19	0.7	1.4	0.0684	0.0025	0.0659
2019-347	wood	CAT	1/7/20	0.72	1.44	0.0684	0.0026	0.0659
2019-350	wood	CAT	5/29/19	2.42	4.84	0.0684	0.0086	0.0598
2019-351	wood	CAT	6/11/19	0.44	0.88	0.0684	0.0016	0.0669
2019-352	wood	CAT	5/30/19	1.76	3.52	0.0684	0.0063	0.0622
2019-353	wood	CAT	5/21/19	1.76	3.52	0.0684	0.0063	0.0622
2019-355	wood	CAT	2/5/21	0.72	1.44	0.0684	0.0026	0.0659
2019-358	wood	CAT	6/3/19	1.76	3.52	0.0684	0.0063	0.0622
2019-364	wood	CAT	5/29/19	1.76	3.52	0.0684	0.0063	0.0622
2019-368	wood	CAT	5/30/19	0.73	1.46	0.0684	0.0026	0.0658
2019-372	wood	CAT	10/10/19	0.44	0.88	0.0684	0.0016	0.0669
2019-373	wood	CAT	5/31/19	0.73	1.46	0.0684	0.0026	0.0658
2019-377	wood	CAT	11/21/19	0.72	1.44	0.1080	0.0026	0.1054
2019-382	wood	CAT	6/5/19	1.76	3.52	0.0684	0.0063	0.0622
2019-389	wood	CAT	7/21/19	1.76	3.52	0.0684	0.0063	0.0622
2019-390	wood	CAT	7/21/19	1.76	3.52	0.0684	0.0063	0.0622
2019-392	wood	CAT	8/2/19	0.44	0.88	0.0684	0.0016	0.0669
2019-395	wood	CAT	8/22/19	1.3	2.6	0.0684	0.0046	0.0638
2019-396	wood	CAT	6/4/20	1.79	3.58	0.0684	0.0064	0.0621
2019-398	wood	CAT	10/3/19	1.26	2.52	0.1080	0.0045	0.1035
2019-400	wood	CAT	1/7/20	0.73	1.46	0.0684	0.0026	0.0658
2019-402	wood	CAT	9/30/19	1.26	2.52	0.0684	0.0045	0.0639
2019-408	wood	CAT	12/18/19	0.72	1.44	0.0684	0.0026	0.0659

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2019-409	wood	CAT	5/5/20	1.13	2.26	0.0684	0.0040	0.0644
2019-410	wood	CAT	12/3/19	0.72	1.44	0.0684	0.0026	0.0659
2019-413	wood	CAT	12/19/19	0.44	0.88	0.0684	0.0016	0.0669
2019-416	wood	CAT	12/6/19	0.73	1.46	0.0684	0.0026	0.0658
2019-417	wood	CAT	1/22/20	0.9	1.8	0.0684	0.0032	0.0652
2019-419	wood	CAT	1/31/20	1.13	2.26	0.0684	0.0040	0.0644
2019-420	wood	CAT	3/19/20	1.49	2.98	0.0684	0.0053	0.0631
2019-424	wood	CAT	12/30/19	0.8	1.6	0.0684	0.0028	0.0656
2019-425	wood	CAT	4/14/21	1.13	2.26	0.0684	0.0040	0.0644
2019-427	wood	CAT	4/23/20	0.72	1.44	0.1080	0.0026	0.1054
2019-428	wood	CAT	2/18/20	0.14	0.28	0.1080	0.0005	0.1075
2019-429	wood	CAT	2/19/20	1.49	2.98	0.0684	0.0053	0.0631
2020-431	wood	CAT	1/29/20	1.79	3.58	0.1080	0.0064	0.1016
2020-433	wood	CAT	2/12/20	1.9	3.8	0.1080	0.0067	0.1012
2020-436	wood	CAT	7/20/20	0.44	0.88	0.0684	0.0016	0.0669
2020-439	wood	CAT	6/23/20	0.72	1.44	0.1080	0.0026	0.1054
2020-440	wood	CAT	6/11/20	1.13	2.26	0.1080	0.0040	0.1039
2020-441	wood	CAT	9/16/20	0.44	0.88	0.0684	0.0016	0.0669
2020-447	wood	CAT	9/18/20	0.72	1.44	0.0684	0.0026	0.0659
2020-448	wood	CAT	8/11/20	0.72	1.44	0.1080	0.0026	0.1054
2020-452	wood	CAT	9/9/20	0.73	1.46	0.0684	0.0026	0.0658
2020-454	wood	CAT	9/17/20	0.74	1.48	0.1080	0.0026	0.1053
2020-455	wood	CAT	3/23/21	0.72	1.44	0.0684	0.0026	0.0659
2020-456	wood	CAT	8/18/20	0.729	1.458	0.0684	0.0026	0.0658
2020-458	wood	CAT	10/28/20	0.44	0.88	0.0684	0.0016	0.0669
2020-462	wood	CAT	11/5/20	0.72	1.44	0.0684	0.0026	0.0659
2020-463	wood	CAT	10/20/20	1	2	0.0684	0.0036	0.0649
2020-464	wood	CAT	12/29/20	0.44	0.88	0.0684	0.0016	0.0669
2020-466	wood	CAT	10/15/20	0.7	1.4	0.0684	0.0025	0.0659
2020-468	wood	CAT	5/4/21	1.3	2.6	0.1080	0.0046	0.1033
2020-469	wood	CAT	3/26/21	0.44	0.88	0.0684	0.0016	0.0669
2020-475	wood	CAT	12/2/20	0.72	1.44	0.0684	0.0026	0.0659
2020-481	wood	CAT	2/9/21	0.73	1.46	0.0684	0.0026	0.0658
2020-482	wood	CAT	3/4/21	0.72	1.44	0.0684	0.0026	0.0659
2020-483	wood	CAT	12/21/20	0.73	1.46	0.0684	0.0026	0.0658
2020-485	wood	CAT	3/31/21	1.13	2.26	0.0684	0.0040	0.0644
2020-487	wood	CAT	2/11/21	0.44	0.88	0.0684	0.0016	0.0669
2020-489	wood	CAT	12/14/20	0.6	1.2	0.0684	0.0021	0.0663
2020-492	wood	CAT	12/21/20	0.77	1.54	0.0684	0.0027	0.0657
2020-496	wood	CAT	2/24/21	0.44	0.88	0.0684	0.0016	0.0669
2021-500	wood	CAT	3/19/21	2.5	5	0.0684	0.0089	0.0595
2021-502	wood	CAT	3/26/21	0.72	1.44	0.1080	0.0026	0.1054
2021-505	wood	CAT	5/20/21	0.8	1.6	0.0684	0.0028	0.0656
2021-507	wood	CAT	5/13/21	0.72	1.44	0.1080	0.0026	0.1054
2021-511	wood	CAT	9/21/21	0.73	1.46	0.0684	0.0026	0.0658

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2021-512	wood	CAT	5/17/21	0.73	1.46	0.0684	0.0026	0.0658
2021-513	wood	CAT	6/15/21	0.72	1.44	0.0684	0.0026	0.0659
2021-514	wood	CAT	5/6/21	0.72	1.44	0.1080	0.0026	0.1054
2021-521	wood	CAT	5/17/21	1.07	2.14	0.0684	0.0038	0.0646
2021-523	wood	CAT	9/30/21	0.73	1.46	0.0684	0.0026	0.0658
2021-524	wood	CAT	7/20/21	0.72	1.44	0.0684	0.0026	0.0659
2021-526	wood	CAT	7/15/21	0.73	1.46	0.0684	0.0026	0.0658
2021-527	wood	CAT	7/13/21	0.73	1.46	0.0684	0.0026	0.0658
2021-531	wood	CAT	8/24/21	0.72	1.44	0.1080	0.0026	0.1054
2021-534	wood	CAT	9/15/21	0.73	1.46	0.0684	0.0026	0.0658
2021-535	wood	CAT	9/7/21	0.72	1.44	0.1080	0.0026	0.1054
2021-539	wood	CAT	12/9/21	0.73	1.46	0.0684	0.0026	0.0658
2021-540	wood	CAT	11/12/21	1.13	2.26	0.1080	0.0040	0.1039
2021-552	wood	CAT	12/2/21	0.73	1.46	0.0684	0.0026	0.0658
2021-553	wood	CAT	2/1/22	0.73	1.46	0.0684	0.0026	0.0658
2021-554	wood	CAT	9/17/22	1.13	2.26	0.1080	0.0040	0.1039
2021-555	wood	CAT	12/2/21	0.73	1.46	0.1080	0.0026	0.1054
2021-556	wood	CAT	5/9/22	0.73	1.46	0.0684	0.0026	0.0658
2021-564	wood	CAT	7/19/22	0.7	1.4	0.0684	0.0025	0.0659
2021-565	wood	CAT	7/16/22	1.13	2.26	0.0684	0.0040	0.0644
2021-567	wood	CAT	10/5/22	1.3	2.6	0.1080	0.0046	0.1033
2021-571	wood	CAT	9/9/22	1.13	2.26	0.0684	0.0040	0.0644
2021-572	wood	CAT	9/14/22	0.72	1.44	0.0684	0.0026	0.0659
2021-573	wood	CAT	9/12/22	0.74	1.48	0.0684	0.0026	0.0658
2021-574	wood	CAT	9/21/22	0.73	1.46	0.0684	0.0026	0.0658
2021-575	Wood	CAT	9/16/22	0.74	1.48	0.0684	0.0026	0.0658
2016-002	wood	Hybrid	5/18/16	0.8	1.6	0.0684	0.0028	0.0656
2016-004	wood	Hybrid	5/19/16	0.8	1.6	0.0684	0.0028	0.0656
2016-005	wood	Hybrid	5/17/16	0.45	0.9	0.0684	0.0016	0.0668
2016-014	wood	Hybrid	5/25/16	0.45	0.9	0.0684	0.0016	0.0668
2019-330	wood	Hybrid	2/21/19	0.8	1.6	0.0684	0.0028	0.0656
2019-357	wood	Hybrid	5/28/19	0.59	1.18	0.1080	0.0021	0.1059
2021-503	wood	Hybrid	7/14/21	1.13	2.26	0.0684	0.0040	0.0644
2016-013	pellet	pellet	5/25/16	1.3	3.06	0.0684	0.0046	0.0638
2016-031	pellet	pellet	8/2/16	1.5	3.06	0.0684	0.0046	0.0638
2016-052	pellet	pellet	5/17/17	1.3	3.06	0.0684	0.0046	0.0638
2016-063	pellet	pellet	8/1/17	1.3	3.06	0.0684	0.0046	0.0638
2016-088	pellet	pellet	11/15/16	1.3	3.06	0.0684	0.0046	0.0638
2016-094	pellet	pellet	11/4/16	1.3	3.06	0.0684	0.0046	0.0638
2016-100	pellet	pellet	11/1/16	1.3	3.06	0.0684	0.0046	0.0638
2016-117	pellet	pellet	11/17/16	1.7	3.06	0.0684	0.0046	0.0638
2016-124	pellet	pellet	12/13/16	1.3	3.06	0.0684	0.0046	0.0638
2016-141	pellet	pellet	3/14/17	1.8	3.06	0.0684	0.0046	0.0638
2016-144	pellet	pellet	3/10/17	1.3	3.06	0.0684	0.0046	0.0638
2017-160	pellet	pellet	4/13/17	1.3	3.06	0.0684	0.0046	0.0638

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2017-162	pellet	pellet	10/10/17	1.8	3.06	0.0684	0.0046	0.0638
2017-167	pellet	pellet	5/12/17	2.1	3.06	0.0684	0.0046	0.0638
2017-175	pellet	pellet	8/8/17	1.3	3.06	0.0684	0.0046	0.0638
2017-196	pellet	pellet	9/8/17	1.5	3.06	0.0684	0.0046	0.0638
2017-204	pellet	pellet	10/13/17	1.35	3.06	0.0684	0.0046	0.0638
2017-218	pellet	pellet	1/31/18	1.35	3.06	0.0684	0.0046	0.0638
2017-222	pellet	pellet	12/5/17	0.73	3.06	0.0684	0.0046	0.0638
2017-226	pellet	pellet	7/22/21	0.95	3.06	0.0684	0.0046	0.0638
2017-233	pellet	pellet	12/11/17	1.7	3.06	0.0684	0.0046	0.0638
2017-235	pellet	pellet	1/9/18	1.6	3.06	0.0684	0.0046	0.0638
2017-237	pellet	pellet	2/27/18	1.6	3.06	0.0684	0.0046	0.0638
2018-238	pellet	pellet	4/19/18	1.1	3.06	0.0684	0.0046	0.0638
2018-275	pellet	pellet	8/14/18	1.1	3.06	0.0684	0.0046	0.0638
2018-281	pellet	pellet	5/30/18	1.39	3.06	0.0684	0.0046	0.0638
2018-285	pellet	pellet	9/27/18	1.39	3.06	0.0684	0.0046	0.0638
2018-286	pellet	pellet	7/17/18	1	3.06	0.0684	0.0046	0.0638
2018-291	pellet	pellet	8/31/18	1.3	3.06	0.0684	0.0046	0.0638
2018-296	pellet	pellet	10/24/18	1.3	3.06	0.0684	0.0046	0.0638
2018-303	pellet	pellet	11/21/18	1.75	3.06	0.0684	0.0046	0.0638
2018-317	pellet	pellet	5/10/19	0.62	3.06	0.0684	0.0046	0.0638
2019-336	pellet	pellet	12/3/19	1.1	3.06	0.0684	0.0046	0.0638
2019-337	pellet	pellet	5/30/19	0.58	3.06	0.0684	0.0046	0.0638
2019-365	pellet	pellet	9/12/19	1.39	3.06	0.0684	0.0046	0.0638
2019-370	pellet	pellet	8/12/19	1.36	3.06	0.0684	0.0046	0.0638
2019-379	pellet	pellet	8/20/19	1.59	3.06	0.1080	0.0046	0.1034
2019-381	pellet	pellet	8/22/19	1.39	3.06	0.0684	0.0046	0.0638
2019-383	pellet	pellet	7/10/19	1.1	3.06	0.0684	0.0046	0.0638
2019-387	pellet	pellet	1/10/20	1.6	3.06	0.1080	0.0046	0.1034
2019-388	pellet	pellet	9/17/19	0.99	3.06	0.0684	0.0046	0.0638
2019-391	pellet	pellet	9/18/19	1.48	3.06	0.0684	0.0046	0.0638
2019-393	pellet	pellet	9/25/19	1.99	3.06	0.0684	0.0046	0.0638
2019-399	pellet	pellet	10/8/19	1.39	3.06	0.0684	0.0046	0.0638
2019-407	pellet	pellet	10/11/19	1.39	3.06	0.0684	0.0046	0.0638
2020-435	pellet	pellet	9/29/20	0.62	3.06	0.0684	0.0046	0.0638
2020-437	pellet	pellet	9/9/20	1.5	3.06	0.0684	0.0046	0.0638
2020-443	pellet	pellet	9/24/20	0.95	3.06	0.0684	0.0046	0.0638
2020-449	pellet	pellet	11/12/20	1.5	3.06	0.0684	0.0046	0.0638
2020-461	pellet	pellet	10/13/20	1.6	3.06	0.1080	0.0046	0.1034
2020-465	pellet	pellet	1/22/21	1.5	3.06	0.0684	0.0046	0.0638
2020-472	pellet	pellet	1/13/21	0.95	3.06	0.1080	0.0046	0.1034
2020-473	pellet	pellet	2/12/21	0.89	3.06	0.0684	0.0046	0.0638
2020-478	pellet	pellet	3/2/21	1.75	3.06	0.0684	0.0046	0.0638
2020-480	pellet	pellet	12/30/20	0.89	3.06	0.0684	0.0046	0.0638
2020-484	pellet	pellet	1/21/21	0.62	3.06	0.1080	0.0046	0.1034
2020-498	pellet	pellet	1/11/21	0.62	3.06	0.0684	0.0046	0.0638

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2021-510	pellet	pellet	5/21/21	0.99	3.06	0.1080	0.0046	0.1034
2021-515	pellet	pellet	6/8/21	0.99	3.06	0.1080	0.0046	0.1034
2021-519	pellet	pellet	8/17/21	0.99	3.06	0.0684	0.0046	0.0638
2021-536	pellet	pellet	11/17/21	0.73	3.06	0.0684	0.0046	0.0638
2021-558	pellet	pellet	8/3/22	1.75	3.06	0.0684	0.0046	0.0638
2021-560	pellet	pellet	3/29/22	1.49	3.06	0.0684	0.0046	0.0638
2021-561	pellet	pellet	8/23/22	0.95	3.06	0.0684	0.0046	0.0638
EPA2020-001	pellet	pellet	4/13/22	0.99	3.06	0.0684	0.0046	0.0638
EPA2020-003	pellet	pellet	5/26/22	0.99	3.06	0.0684	0.0046	0.0638
EPA2021-002	pellet	pellet	8/23/21	0.89	3.06	0.0684	0.0046	0.0638
2016-053	propane	propane	9/1/16	0	0	0.0684	0.0000	0.0684
2016-092	propane	propane	10/13/16	0	0	0.0684	0.0000	0.0684
2017-185	propane	propane	8/8/17	0	0	0.0684	0.0000	0.0684
2017-186	propane	propane	10/4/17	0	0	0.0684	0.0000	0.0684
2017-202	propane	propane	10/19/17	0	0	0.0684	0.0000	0.0684
2017-224	propane	propane	2/23/18	0	0	0.0684	0.0000	0.0684
2018-248	propane	propane	5/30/18	0	0	0.1080	0.0000	0.1080
2018-253	propane	propane	7/13/18	0	0	0.1080	0.0000	0.1080
2018-269	propane	propane	11/7/18	0	0	0.0684	0.0000	0.0684
2018-295	propane	propane	9/24/19	0	0	0.1080	0.0000	0.1080
2018-311	propane	propane	1/17/19	0	0	0.0684	0.0000	0.0684
2019-341	propane	propane	10/8/19	0	0	0.0684	0.0000	0.0684
2019-394	propane	propane	10/17/19	0	0	0.0684	0.0000	0.0684
2019-401	propane	propane	8/27/19	0	0	0.1080	0.0000	0.1080
2019-405	propane	propane	2/4/20	0	0	0.0684	0.0000	0.0684
2020-438	propane	propane	11/23/20	0	0	0.0684	0.0000	0.0684
2020-445	propane	propane	7/7/20	0	0	0.1080	0.0000	0.1080
2020-467	propane	propane	2/17/21	0	0	0.0684	0.0000	0.0684
2020-488	propane	propane	1/10/21	0	0	0.0684	0.0000	0.0684
2020-493	propane	propane	3/10/21	0	0	0.0684	0.0000	0.0684
2020-495	propane	propane	2/23/21	0	0	0.1080	0.0000	0.1080
2021-504	propane	propane	8/25/21	0	0	0.0684	0.0000	0.0684
2021-509	propane	propane	5/19/21	0	0	0.1080	0.0000	0.1080
2021-528	propane	propane	8/12/21	0	0	0.0684	0.0000	0.0684
2021-557	propane	propane	1/11/22	0	0	0.1080	0.0000	0.1080
2021-566	propane	propane	10/4/22	0	0	0.0684	0.0000	0.0684
2021-569	propane	propane	8/18/22	0	0	0.0684	0.0000	0.0684
2021-570	propane	propane	7/14/22	0	0	0.0684	0.0000	0.0684
EPA2020-002	propane	propane	9/1/22	0	0	0.0684	0.0000	0.0684
2021-568	Kerosene	kerosene	8/11/22	0	0	0.0684	0.0000	0.0684
2016-125	kerosene	kerosene	1/6/17	0	0	0.0684	0.0000	0.0684
2018-259	kerosene	kerosene	3/27/18	0	0	0.0684	0.0000	0.0684
2019-403	kerosene	kerosene	10/9/19	0	0	0.0684	0.0000	0.0684
2019-414	kerosene	kerosene	12/10/19	0	0	0.0684	0.0000	0.0684
2020-430	kerosene	kerosene	3/12/20	0	0	0.0684	0.0000	0.0684

Program Tracking # (YYYY-XXX)	New Device Type	CAT/NC/Hybrid	Install Date	PM2.5 Emissions				
				Rate (g/hr)	Factor (lb/ton)	Before (tpy)	After (tpy)	Difference (tpy)
2020-432	kerosene	kerosene	3/5/20	0	0	0.0684	0.0000	0.0684
2020-451	kerosene	kerosene	10/19/20	0	0	0.0684	0.0000	0.0684
2021-562	kerosene	kerosene	5/31/22	0	0	0.0684	0.0000	0.0684
EPA2021-001	kerosene	kerosene	7/7/21	0	0	0.0684	0.0000	0.0684
2021-518	heat pump/wood	heat pump/wood	1/8/22	0	0	0.0684	0.0000	0.0684
2021-559	heat pump	heat pump	7/6/22	0	0	0.0684	0.0000	0.0684
EPA2018-0011	Heat Pump	heat pump	2/23/22	0	0	0.1080	0.0000	0.1080
EPA2018-009	Heat Pump	heat pump	1/31/22	0	0	0.1080	0.0000	0.1080
EPA2021-003	heat pump	heat pump	6/17/21	0	0	0.0684	0.0000	0.0684
EPA2021-004	heat pump	heat pump	7/19/21	0	0	0.0684	0.0000	0.0684
EPA2021-008	heat pump	heat pump	10/18/21	0	0	0.0684	0.0000	0.0684
Total Installations as of 10/18/22								506
Wood Stoves Total								240
Noncatalytic Stoves								241
Catalytic Stoves								145
Hybrid Stoves								7
Pellet Stoves								67
Propane Stoves								29
Kerosene Stoves								10
Heat Pumps								7
Total PM2.5 Emissions Saved (tons per year)								33.268
Total PM2.5 Emissions Saved (tons per day)								0.091