December 14, 2021

Mr. Michael Regan
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

Submitted via regulations.gov

RE: Clean Air Task Force Comments on "Policy Assessment for Reconsideration of the National Ambient Air Quality Standards for Particulate Matter, External Review Draft," 86 Fed. Reg. 56,263 (Oct. 8, 2021), Docket ID No. EPA–HQ–OAR–2015–0072.

Clean Air Task Force (CATF) is pleased to offer these comments on the U.S. Environmental Protection Agency's (EPA) Policy Assessment for Reconsideration of the National Ambient Air Quality Standards for Particulate Matter, External Review Draft (Draft PA). Founded in 1996, CATF advocates for a cleaner energy sector that addresses the climate emissions and disparate health effects of energy production on fence-line communities in a financially, socially, and environmentally sustainable way. CATF lawyers, scientists, policy analysts, and advocates seek to help safeguard against the worst impacts of air pollution and climate change through work in research, analysis, public advocacy, and on projects to catalyze the rapid deployment of lower carbon technologies.

Comparison of sub-daily $PM_{2.5}$ concentrations under current and potential alternative Daily Design Values

As discussed in the Draft PA, Wyatt et al.[1] report controlled human exposures that demonstrate biological effects in response to exposure to 4-hours of $PM_{2.5}$ at 37.8 $\mu g/m^3$ mean. In healthy young adults, elevated $PM_{2.5}$ was associated with decreased lung capacity and reduced pulmonary function. $PM_{2.5}$ exposure was associated with increased serum levels of several inflammatory markers. As summarized in the Draft PA Table 3-4, multiple studies report adverse effects at 2-hour exposures at levels over 120 $\mu g/m^3$. Although these studies are limited, collectively they indicate mechanisms for harm to generally healthy individuals. CATF conducted an analysis to assess the effectiveness of a 24-hour standard in limiting sub-daily levels of $PM_{2.5}$ at levels assessed in controlled human exposure studies.

The policy assessment presents high-level grouped analysis of sub-daily $PM_{2.5}$ concentrations, comparing locations that meet both of the current standards to locations that fail to meet one or both (Figures 2-19, A-2, A-3). At section 3.5.1.3 of the Draft PA, EPA concludes "… at air quality monitoring sites meeting the current primary $PM_{2.5}$ standards (i.e., the 24-hour standard

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[1] Lauren H. Wyatt et al., *Low levels of fine particulate matter increase vascular damage and reduce pulmonary function in young healthy adults*, 17 Particle and Fibre Toxicology 58 (2020).

and the annual standard), the 2-hour concentrations generally remain below 10 μg/m^3, and virtually never exceed 30 μg/m^3. Two-hour concentrations are higher at monitoring sites violating the current standards, but generally remain below 16 μg/m^3 and virtually never exceeding 80 μg/m^3." Based on those statistics, the Agency finds sub-daily exposures to be of minor relevance to the National Ambient Air Quality Standards (NAAQS).

CATF would like to express concerns with the approach presented in the PA. First, the analysis combines two very broad sets of data (attaining and non-attaining), which can mask the relevant concentrations experienced at locations just meeting the current or alternative standards. Second, a location with 100% data capture would have 8760 possible 2-hour averages in a year, which means the 'virtually never' claim could be ~90 instances per year. As there is general agreement that a 24-hour average is more appropriate than an annual average to limit sub-daily exposures, CATF focused on discrete values of the daily metric to ascertain the effectiveness of the daily standard in controlling short-term exposures. CATF analyzed Federal Equivalent Method (FEM) data from 2018-20 at locations that would just meet the current daily standard, or alternative standards at 30 or 25 μg/m^3.

CATF used EPA's determination of current daily Design Values (DV) to identify 41 locations in the U.S. that monitored hourly $PM_{2.5}$ levels. Since there were very few locations at each discrete integer DV, CATF grouped sites that generally just met the current DV of 35 (n=13 with DV 34, 35 or 36), would meet a three-year average of 30 (n=11 with DV 29,30 or 31) or would meet 25 (n=17 with DV of 25 or 26). For each location, 2- and 4-hour averages were calculated and then the max daily value was determined. This approach contrasts with EPA's analysis, which presumably included multiple averages at each location and day; allowing multiple averages per day could potentially minimize the apparent frequency of an extreme occurrence compared to an assessment that considers the daily maximum sub-daily average. In addition, by grouping locations that failed to meet either the annual or daily standard, EPA's analysis cannot identify the extent to which the daily standard limits sub-daily levels.

Figure 1 and Figure 2 display the frequency distribution of daily maximum 2- and 4-hour values at the three DV groupings. Locations with concentrations near the current standard have substantially greater maximum daily 2- and 4-hour concentrations as compared to the two more stringent values considered (30 and 25). The difference between the two lower options is apparent for 5% of the days. EPA's analysis suggested that violating monitors virtually never exceeded a two-hour value of 80. CATF's analysis indicates that 9 days had a two-hour daily max value of 80 or higher for monitors at the current daily standard, with 4 and 2 days above that level respectively for monitors at 30 or 25. In other words, reducing the daily three-year average 98th percentile from 35 to 30 or 25 would reduce the number of days with sub-daily averages above 80. Also, the three considered DVs of 35, 30, and 25 would allow concentrations of 120 μg/m^3 or higher for 4, 1.5, and 1 days, respectively. Looking to the Wyatt et al. study results, locations at the current standard would experience 29 days with 4-hour max values over 37.8, compared to 17 and 13 days at DVs of 30 and 25.

Based on this limited analysis, CATF finds a daily design value of 30 or 25 would drastically reduce ambient levels of 4-hour maximums shown to adversely affect healthy individuals. In addition to reducing peak daily and sub-daily exposures, a reduction of the extremes would have the additional effect of reducing the annual mean. The annual distribution of daily 2- and 4-hour max values for these three DVs is less than 3 μg/m^3 different for a full 8 months of the year; this reinforces the significance and potential impact of a reduction in the daily design value that would result in a preferential reduction in the high end extreme sub-daily levels.

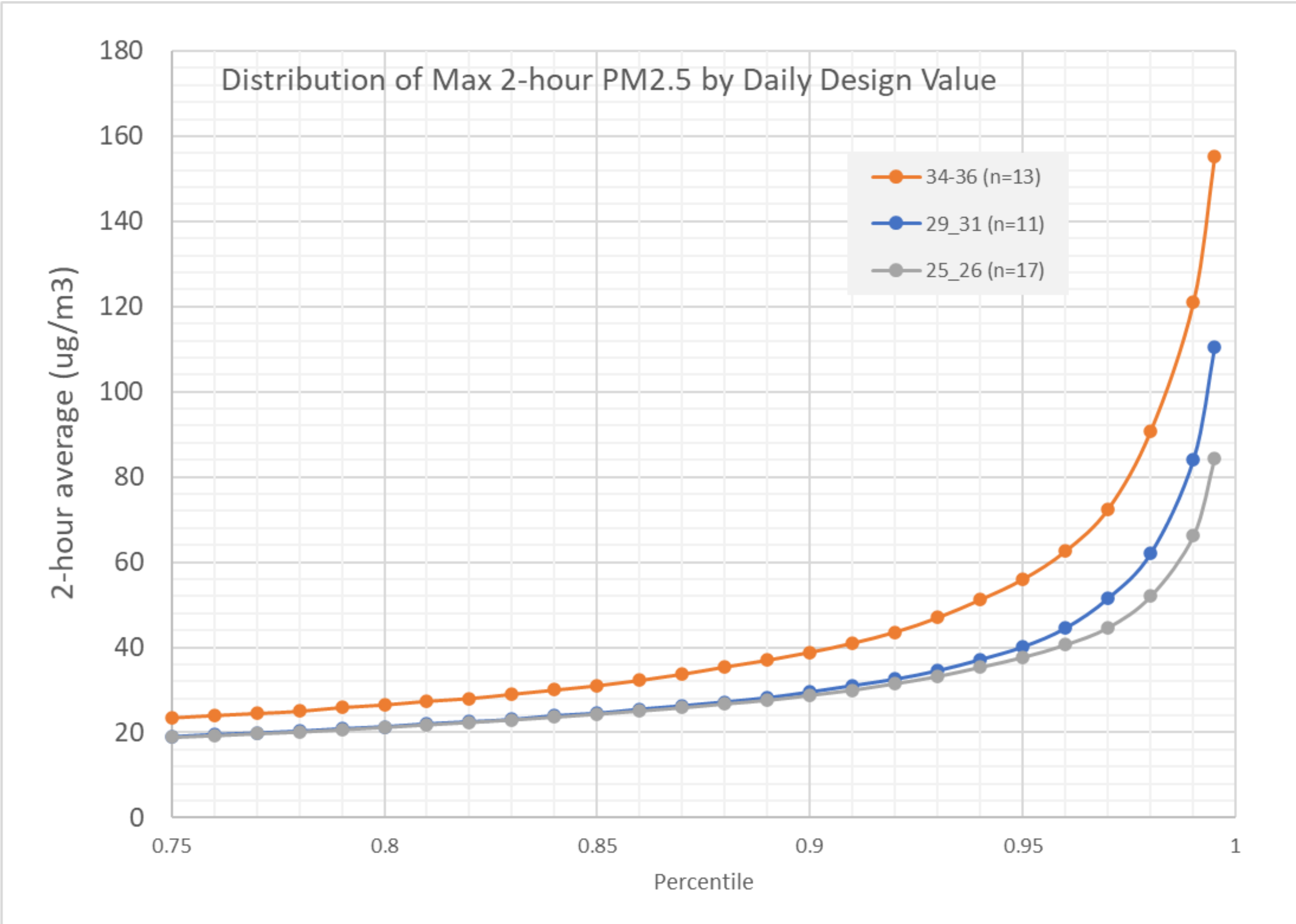

Figure 1 Distribution of daily Maximum 2-hour average by Design Value Level. 2% represents one week per year, the span of this chart covers the worst ~90 days.

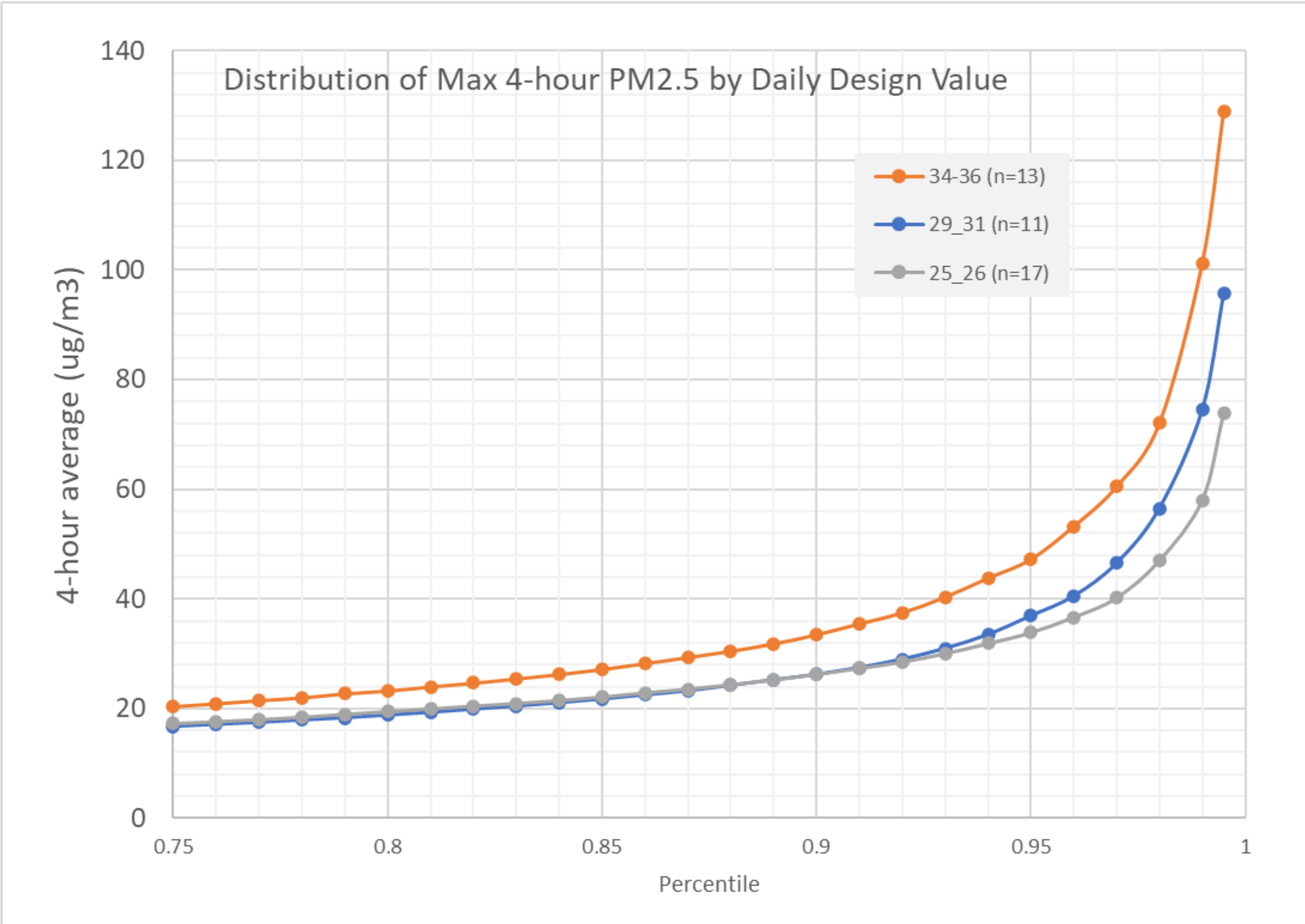

Figure 2 Distribution of daily Maximum 2-hour average by Design Value Level.

Daily standard form and the effect on actual peak exposures compared to perceived protectiveness

The form of the daily standard affects the stringency in ways not apparent by simple inspection. For example, most who look at the 98th percentile form would assume that over three years a location would be allowed to exceed the standard seven times each year, totaling 21 days over three years. This prediction underestimates the number of days that could exceed the 3-year average of the 98th percentile because year-to-year variability causes variations in the number of exceedance days allowed. Figure 3 presents data that compares the expected number of days above the 98th percentile (based on number of sampled days) versus the actual measured number of days above the 98th percentile. The data are from the locations that had design values of 24/25/29/30/31/34/35/36, which are the same locations analyzed for the sub-daily comparisons presented in these comments. Overall, the scatter suggests that over a three-year period there will be 22 days that exceed the three-year average of the 98th percentile.

Also, the current form of the standard relies on the 24-hour average from midnight to midnight. The dynamics of hourly $PM_{2.5}$ variations are such that a strict midnight to midnight average does not reflect the worst continuous 24-hour exposures. CATF reviewed data from Allegheny County, PA to determine how a rolling 24-hour average could impact a three-year average 98th percentile value. Hourly data were used to calculate rolling 24-hour averages from 2018-2020 at monitor 42-003-0064. Peak 24-hour rolling averages were identified in the dataset and then the hours contributing to maximum 24-hour values were blocked out and not included in adjacent 24-hour rolling averages. For each year, the rolling 24-hour averages were ranked and the 98th percentile value was determined. Using midnight to midnight, the yearly 98th percentiles are 33.5/45.1/31.2 while the corresponding running 24-hour values are 38.8/46.2/32.7. The resulting daily design values are 37 $\mu g/m^3$ under the midnight-to-midnight method compared to 39 $\mu g/m^3$ for the rolling average approach; the difference in three-year average is 2.6 $\mu g/m^3$ when not following data handling rounding conventions.

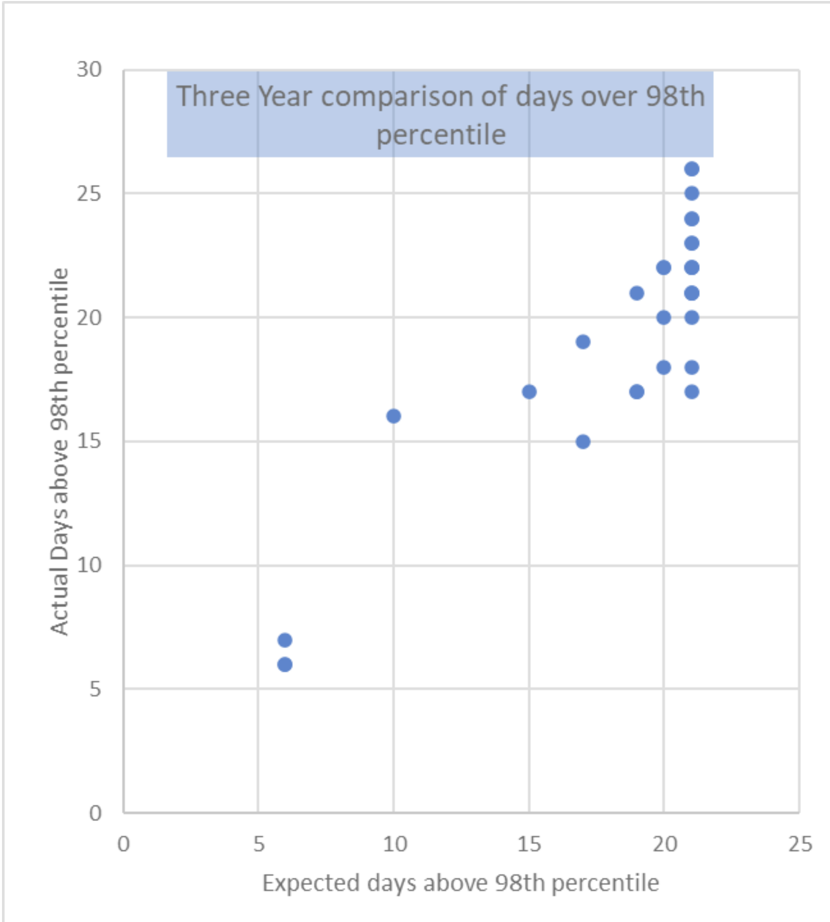

Figure 3 Comparison of 3-year total of Expected versus Actual days above the 98th percentile average. Note a location measuring 1 in 3 days would have the third high as the DV and expect two days above, while a daily monitor would have the 8th highest value as the 98th percent and expect 7 days above that. Over three years, the expectation would be 6 and 21 days above the 98th percentile level. Note the range of actual for daily monitors is 17 to 26, averaging 22.

Taken together, these two analyses indicate the current form of the daily standard may underestimate the true extreme levels of $PM_{2.5}$. The three-year average methodology allows for, on average, one extra day over the DV at a location, or a 5% increase in the 'expected' number of days over the DV based on nominal consideration of a single year 98th percentile value. Use of a rolling average suggests true 24-hour maximum exposures could be 2 $\mu g/m^3$ higher than the current form and represents another >5% difference in the perceived protectiveness of the current form of the daily standard.

Demographic comparison of Maximum Monitor populations versus county average

The PA discusses the relationship between $PM_{2.5}$ concentrations at the annual DV monitor, as compared to regional averages of monitors, and both spatial and population-weighted averages of hybrid model PM estimates. The discussion appears geared to emphasize the DV monitor is generally the greatest value, and most population exposures are lower than the level of the local DV. CATF conducted a demographic analysis of ten counties with annual DVs near the current standard that are also included in the study areas used in the risk assessment (see Table 1). The analysis contrasts the racial and economic demographics of people living within a 3-mile radius of the DV monitor to the county as a whole. For the locations considered, populations near the DV monitor include 14% of the county population on average (1.8 million out of 13 million people). Five locations had both higher percentages of POC and poverty within 3 miles of the DV monitor, with four locations having higher poverty rates and the last location having a higher percentage of minorities.

			County Total	3 mile radius	County Total	3 mile radius	County Total	3 mile radius
AREA	STATE	COUNTY	% POC/ non-white	% POC/ non-white	% poverty	% poverty	Total Population	Total Population
Phoenix-Mesa-Scottsdale, AZ	AZ	Pinal	17%	50%	17.3%	29.3%	406,584	8,497
Atlanta, GA_1	**GA**	**Fulton**	**54%**	**50%**	**17.6 %**	**21.7%**	**1,010,562**	**254,807**
Atlanta, GA_2	**GA**	**Fulton**	**54%**	**51%**	**17.6 %**	**19.4%**	**1,010,562**	**160,782**
San Francisco-Oakland-Hayward, CA	CA	Alameda	49%	47%	12.5%	17.6%	1,638,215	216,549
Riverside-San Bernardino-Ontario, CA	CA	Riverside	20%	47%	16.8%	13.4%	2,361,026	131,795
Sacramento--Roseville--Arden-Arcade, CA	CA	Sacramento	36%	30%	18.2%	22.3%	1,501,335	183,432
San Jose-Sunnyvale-Santa Clara, CA	CA	Santa Clara	44%	60%	9.5%	16.7%	1,918,044	312,869
Indianapolis-Carmel-Anderson, IN	IN	Marion	34%	52%	21.1%	35.6%	939,020	154,943
Cincinnati, OH-KY-IN	OH	Hamilton	31%	57%	18.3%	38.9%	807,598	176,751
Medford, OR	OR	Jackson	8%	13%	19.0%	19.4%	212,567	118,577
Pittsburgh, PA	PA	Allegheny	19%	18%	13.0%	17.4%	1,230,459	86,083

Table 1 Census data comparison between populations near the highest monitor and the county.

Table 1 presents the results and highlights the fact that populations living in the most polluted neighborhoods, as determined by the monitor network, tend to have higher percentages of POC and greater poverty. The risk from increased exposure potential is exacerbated by the evidence presented that suggests minority populations may have greater inherent risk from pollution exposure. The demographics and sheer number of people living near these DV monitors across the country provide further rationale for strengthening the PM NAAQS to adequately protect all people.

CATF previously urged EPA to strengthen the NAAQS in joint comments on the 2019 Draft Particulate Matter Policy Assessment[2] and on the proposed review of the PM NAAQS.[3] EPA's draft Supplement to the 2019 Integrated Science Assessment and the draft 2021 Policy Assessment have provided additional evidence to support those previous recommendations. Consistent with our previous recommendation, we urge EPA to revise the annual standard for $PM_{2.5}$ to 8 $\mu g/m^3$. We also recommend EPA revise the 24-hour standard for $PM_{2.5}$ to 25-30 $\mu g/m^3$.

Respectfully submitted,

John Graham
Hayden Hashimoto
Clean Air Task Force
114 State Street, 6th Floor
Boston, MA 02109
(617) 624-0234

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[2] Comments of Clean Air Task Force et al., at 13 (Nov. 12, 2019), available at https://www.regulations.gov/comment/EPA-HQ-OAR-2015-0072-0058.
[3] Comments of Clean Air Task Force et al., at 181-82 (June 29, 2020), available at https://www.regulations.gov/comment/EPA-HQ-OAR-2015-0072-0973.