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Boiler MACT – Rulemaking Status and CO Remand Issues

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Boiler MACT court decisions remanded certain issues

- 2016 decision
  - **Remanded** limits where EPA excluded co-fired units from its analyses (based subcategory definition on 10% fuel threshold but used 90% fuel threshold to set floors, so boilers burning a mixture like 50% gas and 50% solid fuel were not considered in floor setting)
  - **Remanded** CO as a surrogate for non-dioxin HAPs for more explanation
  - Upheld EPA's discretion on subcategories, UPL methodology for limits, and work practices for certain boilers
- 2018 court decision
  - **Remanded** 130 ppm CO cutoff (inadequate explanation)
  - Upheld Startup and Shutdown provisions

Boiler MACT Current Status

- EPA has engaged their contractor again and they are working through the revisions to the limits based on the remanded subcategories and evaluating the impacts of the changes.
- Solid fuel mercury and HCl limits will go down (6% for Hg existing and likely 13% or so for HCl existing). They are adding all boilers with any test data in the database to the pool of data being used to determine existing source floors and calculate limits (even if only 1 or 2 test runs).
- Likely only a couple percent of boilers will be affected, based on CEDRI data.
- Boiler MACT Trade Group Coalition is working on a white paper for EPA to help address the CO remand issues.

Timetable:

Action	Date
NPRM	01/00/2020
Final Rule	01/00/2021

Overview of CO Remand Issues

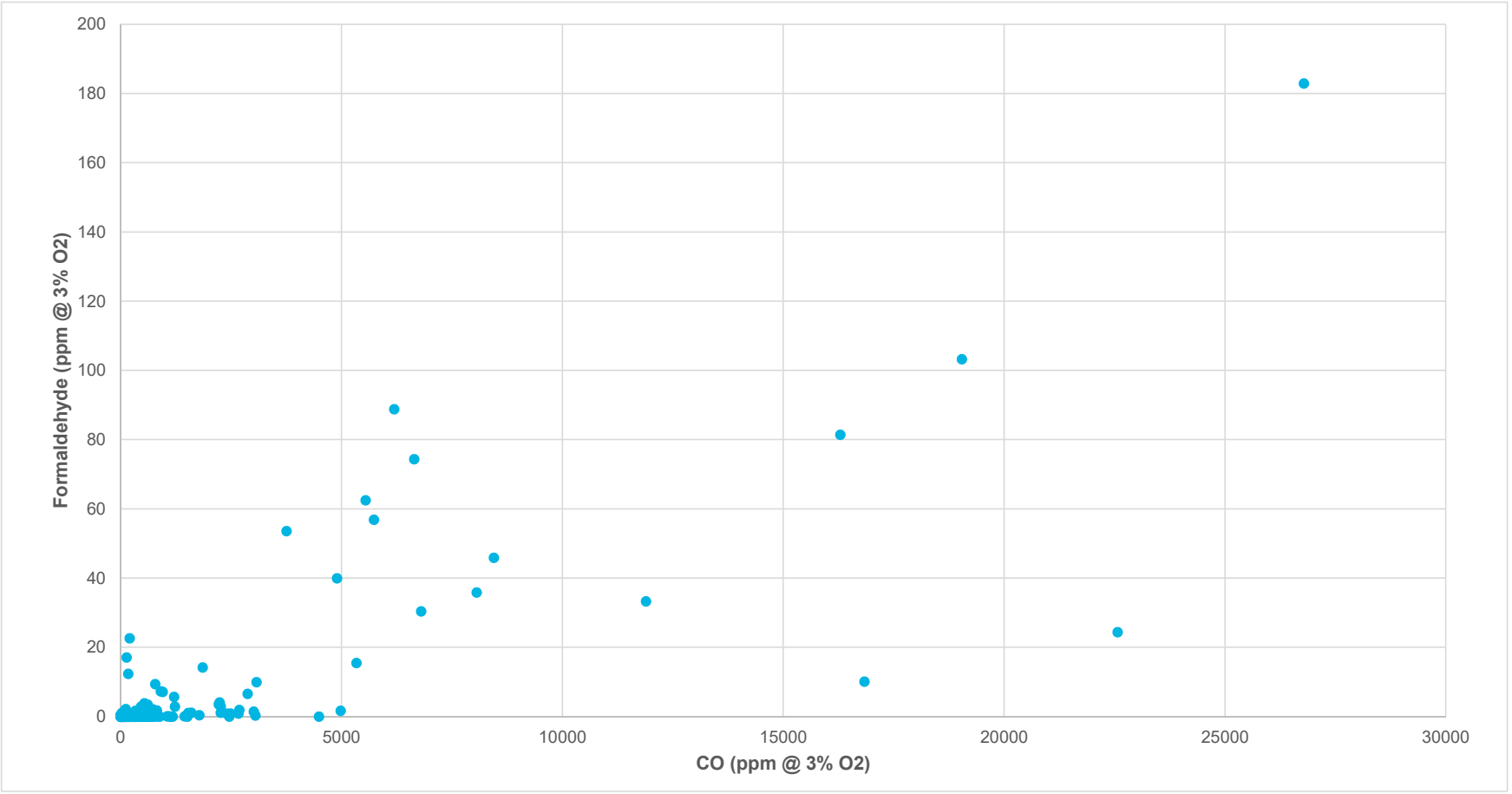
- As a result of court decisions in July 2016 and March 2018, there are two issues that must be addressed related to the emission limits for CO emissions that the Boiler MACT rule established.
  - EPA must adequately explain how CO emissions act as a reasonable surrogate for non-dioxin organic HAP emissions
  - EPA must adequately explain its decision to set CO limits no lower than 130 ppm.

- The following slides summarize the discussion in the draft CO white paper.

CO Emissions Are a Reasonable Surrogate for Non-dioxin Organic HAP Emissions

- CO is a common product of incomplete combustion.
- CO is one of the most difficult PICs to oxidize completely.
- CO has historically been used in practice as an indicator of combustion quality and in regulations for compliance.
- Data in EPA's Boiler MACT database demonstrate that as CO emissions increase, organic HAP emissions increase.

Paired Formaldehyde and CO Data for Major Sources



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There are no Boiler Controls that Reduce Non-Dioxin Organic HAP but not CO

- The best performing boilers do not use control technologies and methods that reduce organic HAP emissions beyond what they achieve by regulating CO alone.
  - Many industrial boilers/process heaters utilize post combustion controls for PM, acid gases, NOx, and/or mercury. These controls do not affect emissions of CO or non-dioxin organic HAPs.
  - Boilers in EPA database do not have CO or NDOH controls.
  - Solid fuel boilers do not use oxidation catalyst (fouling).
  - EPA test program in 1993 determined that carbon injection does not control NDOH.

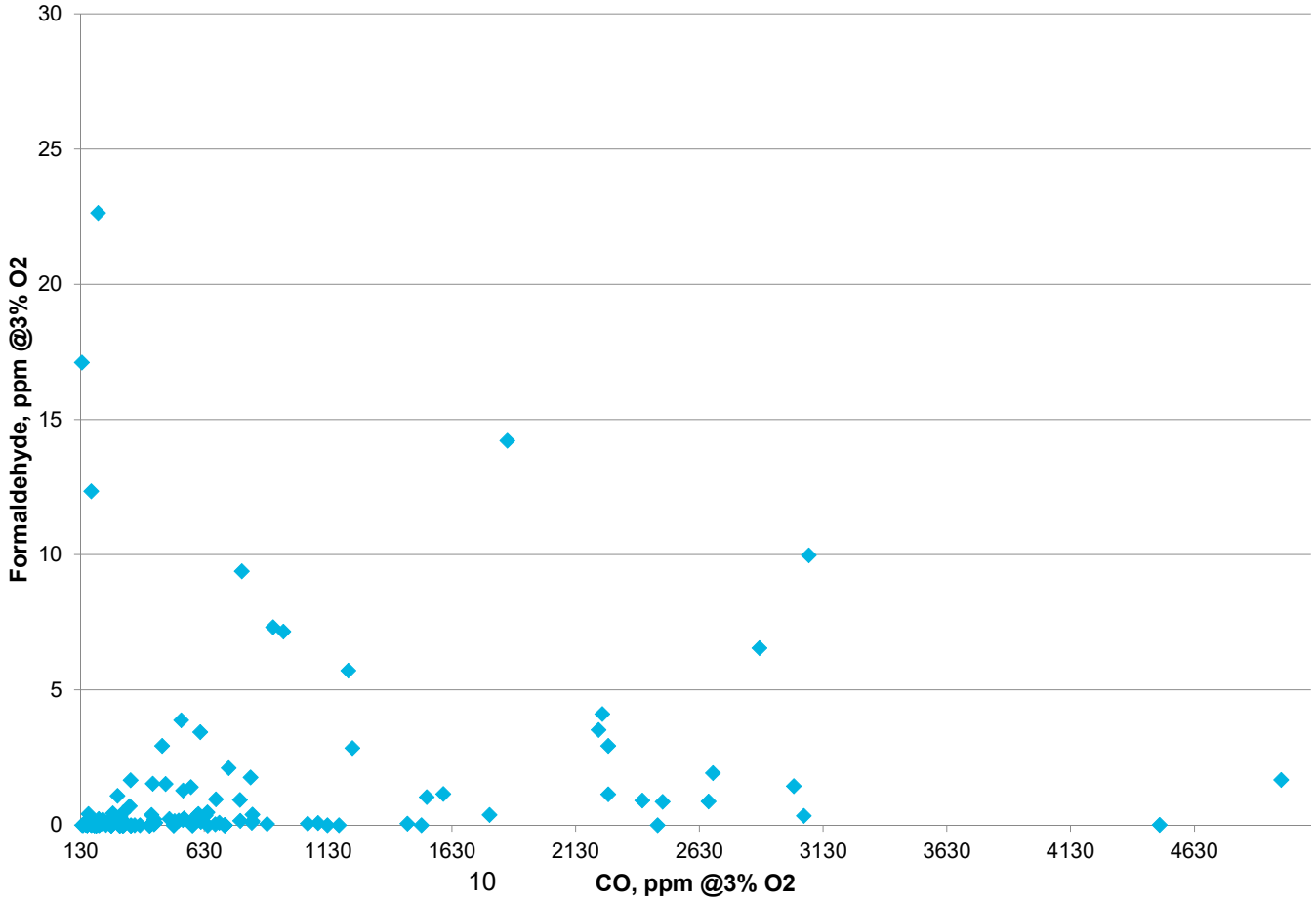
It is not Appropriate to Set CO Limits <130 ppm @ 3% O_2

- The level of organic HAP emissions becomes insensitive to CO concentration below a certain value of CO. EPA reached this conclusion in the Hazardous Waste NESHAP.
- Because its chemical kinetics make CO far more difficult to oxidize than other organic compounds, it is not necessary to drive CO emissions to zero to obtain a corresponding minimization of organic emissions.
- At CO emission levels below 130 ppmv at 3% O_2, differences in organic HAP emissions are negligible.
- Forcing CO emissions lower and lower ends up over-constraining the combustion process, and may increase NOx emissions without documented improvements in organic HAP emissions.

Data Below 130 ppm CO are Variable, Not Unreliable

- At very low levels of CO, the corresponding non-dioxin organic HAP data are also very low and highly variable.
- EPA interpreted this variability as unreliability/measurement error in the preamble to the 2013 Final Boiler MACT Rule when it said "It is possible that imprecise formaldehyde measurements at low concentrations (i.e., 1-2 ppm) may account for this slight increase in formaldehyde emissions observed at CO levels below 100 ppm corrected to 7 percent oxygen. Based on this, we do not believe that such measurements are sufficiently reliable to use as a basis for establishing an emissions limit."
- The data are likely just randomly variable at these low levels because as CO decreases below 130 ppmv at 3% O_2, HAP emissions do not continue to decrease, but simply exhibit normal emissions measurement variability.

Paired Solid Fuel Unit CO/Formaldehyde Data, CO>130 ppm



Above 130 ppm @3% O_2, formaldehyde emissions increase as CO emissions increase.

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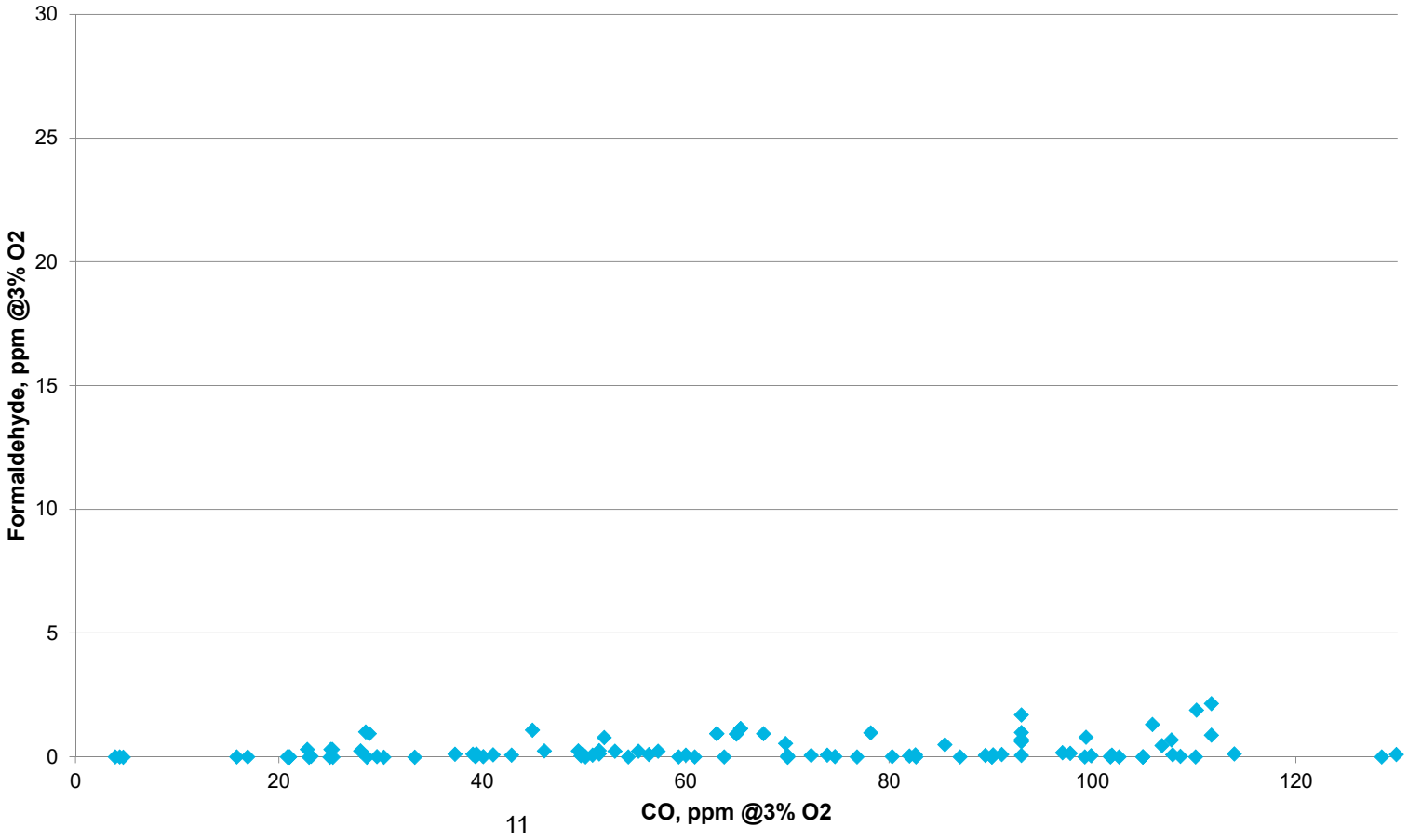
Paired Solid Fuel Unit CO/Formaldehyde Data, CO<130 ppm



Below 130 ppm @3% O_2, formaldehyde emissions are consistently low (less than 2 ppm) and trend in a flat line, not downward with decreasing CO emissions.

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In Conclusion:

- Because CO is more difficult to oxidize to CO_2 than organic HAP compounds, CO emissions from a boiler or process heater are a good indicator of process stability and represent a conservative surrogate for organic HAP emissions,
- There are no emission controls in use on industrial boilers and process heaters that reduce organic HAP emissions that do not concurrently reduce CO emissions, and
- 130 ppm at 3% O_2 is an appropriate surrogate threshold for minimization of organic HAP emissions. EPA's data demonstrates that reductions in CO emissions below this level do not result in further reductions in organic HAP emissions.

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Thank You – Questions?

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