

From: [Lauren Whybrew](#)
To: mc Alpine.jay@epa.gov
Cc: [Aaron Manley](#)
Subject: CDK Modeling Setup
Date: Monday, January 8, 2024 11:30:00 AM
Attachments: [CDK Side View.png.jpg](#)
[CDK Side View.png](#)

Hi Jay,

Not sure if you remember me – we briefly met at the PNWIS conference this past fall. We have a case that could use some additional expertise and insight, and your name came to my mind.

We have a construction application from a lumber mill in our jurisdiction that is removing their existing batch kilns and hog fuel boiler to install direct-fired continuous dry kilns (CDKs). We are reviewing the modeling submitted by a consultant on behalf of the applicant, and were hoping you may be able to shed some light on the approach they used for modeling PM_{2.5} emissions from the CDK “stacks”. I attached a diagram that gives a side profile view of one end of the CDK.

On both ends of the CDK, there are two stacks with identical parameters (flowrate, temp, height, etc.). Instead of modeling each stack as its own point source (4 total for the CDK), the applicant merged the two stacks on either end:

- Merged stack volumetric flowrate is 2x the individual stack’s flowrate
- Velocity was unchanged
- Equivalent diameter for the merged stack is larger (1.18 m vs 0.83 m).

I’m puzzled as to why merging the stacks would even be done (the setup has 600+ volume sources and 10+ point sources for the whole facility – what’s two more?), and rather, if it’s appropriately applied. The applicant quotes their own book which highlights how to determine equivalent parameter values for merged plumes originating from a segmented stack with varying velocities, temps, diameters, etc. The effective stack velocity for the merged stack is shown as the average of the individual flue velocities, weighted for volumetric flow. Which is why in this case, the effective velocity of the merged stack is the same as the individual stack – because the two individual stacks are identical.

My knee jerk reaction when I saw the larger diameter and volumetric flow for the merged stack is whether the effective stack height would be inappropriately estimated as higher due to this merging technique, thereby possibly underestimating ground level impacts. We are scrutinizing this and would appreciate any insight you have; the application shows only an ~6% margin for the 24-hour PM_{2.5} NAAQS, and the emissions from these CDK stacks are a decent contribution. I’ve cc’d the permit writer for this case, Aaron Manley.

Thank you so much!
Lauren Whybrew, Engineer II

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