

# TESTING EMISSIONS FROM HEM-FIR LUMBER

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## Lumber Kiln Emissions Testing

- Why test?
- Test program
- Results
- Summary



## Why Test?

- MACT Rules: Hazardous air pollutants
  - plywood and composite wood products
  - boilers
- Thresholds
  - >10 tons/year of single HAP
  - >25 tons/year of all HAPs
- 189 HAPs- primarily six in wood products
- MACT Rules: Low risk subcategory
  - look up tables
  - site specific testing and modeling
- If low risk is demonstrated without control equipment, facility is in compliance with the rule
- What capacity mill needs to consider HAPs?
- 150-200 mmbf/year depending upon
  - species
  - co-located operations including boilers
  - critical single HAP - methanol  
up to 90% of total

## Why Not Use Emission Factors?

- Emission factors should be used first
  - May provide a large data base
- However,
  - May not be appropriate to your facility
    - species
    - product - e.g., bark from trees kept in saltwater; contaminated wood from demolition
- May not be accurate for your facility

## Test Program

Team - See addendum for contact information

1. EPA -OAQPS-Gary McAlister
2. Geomatrix - Ken Richmond
3. Interpoll Laboratories - Dan Despen
4. NCASI - Dr. David Word
5. Oregon State University - Dr. Mike Milota
6. Potlatch Forest Products Corporation--Berne Wilmarth/Don Hejna

### Alternatives

- Full scale kiln testing
  - Vents make it difficult, but possible
  - Stacks are easier
  - Kilns inherently leak - how much?
- Photographs
- Screen for presence of HAPs
  - Sample concentration inside kiln
- Small scale kiln test
  - Based on PCWP MACT low risk demonstration
  - Regulatory agencies may require different procedures for other purposes





OSU Small-Scale Kiln

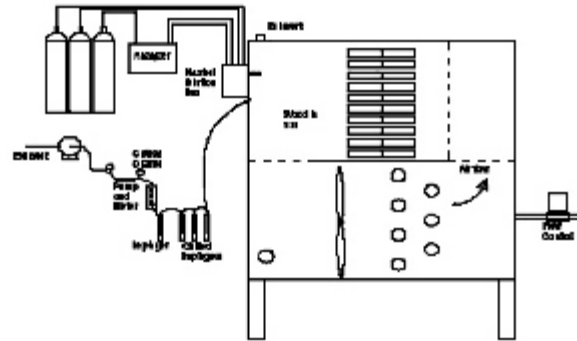
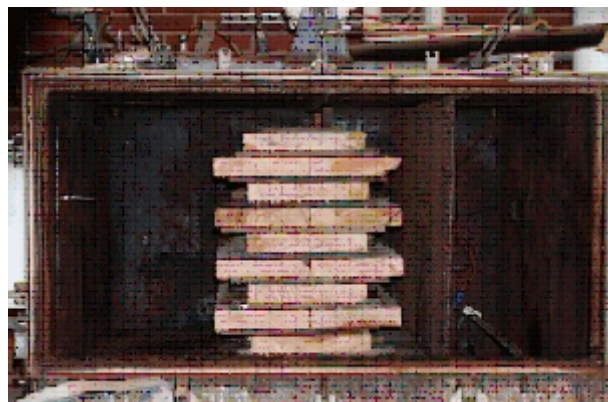


FIGURE 1. Schematic of kiln and sampling system.



## **Test Program**

- Purpose
  - Estimate HAPS from drying hem/fir
- Lumber Drying Test Plan based on
  - App C to Subpart DDDD of Part 63 – Considerations for a small-scale kiln emission testing program
- Test Plan reviewed by
  - NCASI - Dr. David Word
  - EPA-OAQPS - Gary McAlister - no formal approval

### **App C to Subpart DDDD of Part 63**

#### **Considerations for a Small-Scale Kiln Emission Testing Program**

- Representative samples of lumber
- Kiln operating parameters, similar to full scale kilns (air flow, temperature, time)
- Emissions sampling
- Sample intervals (3 hrs) and runs (2)
- Reporting - graphs, numerical data, water balance, MDL, emissions rates
- Guidance - NCASI TB-845

#### **Test Program - Reviews**

- EPA issues addressed in Test Plan Review
  - Use of GC/MSD v. GC/FID in NCASI 99.02
  - Detection limits < 1 ppm
  - QA/QC spike trains - lab and field
  - Timber location/harvest date/time in log yard
- Post Test Review
  - Use of silica gel
  - One-hour sampling to avoid errors

#### **Test Program - Stack Tester**

- Criteria for selecting stack tester
  - Confidence
    - 30 year history with wood products
    - pioneer work with HAPs, ethanol industry
    - QA/QC and detection capability
  - Truck mounted lab for immediate results

## Test Program - Results, lb/mbf

Emission	Kiln Run #1	Kiln Run #2	Average	PWCP Table 2A
Acetaldehyde	0.0424	0.0499	0.0461	0.065
Propionaldehyde	0.0027	0.0028	0.0028	-
Acrolein	0.0018	0.0020	0.0019	0.009
Methanol	0.1742	0.1743	0.1743	-
Phenol	0.0013	0.0008	0.0011	0.010
Formaldehyde	0.0042	0.0039	0.0040	0.034
Benzene	0.0007	0.0006	0.0006	NA
Total VOC as Carbon	0.2199	0.1842	0.2021	

## Test Results - Caveats

- Be careful of one test result
- Adjust to KD target moisture 17-19%
- As a minimum, correct with statistics, or add 50-100% safety factor
- Example
  - Acrolein test result - 0.002 lb/mbf
  - Acrolein - EPA table - 0.009 lb/mbf
  - Stack tester more comfortable with 0.009

## Summary

- Small-scale kiln testing
  - Accepted by EPA for low risk determination
- Test plan
  - Follow guidance in App C to Subpart DDDD of Part 63 --  
Considerations for a small-scale kiln emission testing program
  - EPA Review - Resolve issues - No written approval
- Be wary of single test results
  - Add safety factor, at least statistical factor
- Stack testing program
  - Confidence in stack tester
    - Detection limit capability for HAPs
    - QA/QC
    - On-site analysis v. Lab

### Test Program Team

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### Emission Factor References

1. EPA Emissions Factors, PCWP MACT (FR Vol. 71, No. 32/Thursday, February 16, 2006).
2. June 9, 2000 letter to Mary Tom Kissle (EPA) from Katie Hanks, MRI (Docket), Subject" Emissions Estimates (OAR-2003-0048-0189)
3. Milota, M.R. "Small-Scale Kiln Study Utilizing Ponderosa Pine, Lodgepole Pine, White Fir, and Douglas Fir" report to Intermountain Forest Association
4. Milota, M.R., VOC Emissions from Douglas-fir: Comparing a commercial and a laboratory kiln, Forest Products Journal, vol. 50, No. 7/8.
5. A comparative study of VOC emissions from small-scale and full scale lumber kiln drying southern pine, NCASI TB-845, May 2002.
6. A small-scale kiln study on Method 25A measurements of volatile organic compound emissions from lumber drying, NCASI TB-718, July 1996.

