

# Grease Removal from Commercial Cooking



*The  
Efficiency  
Challenge!*

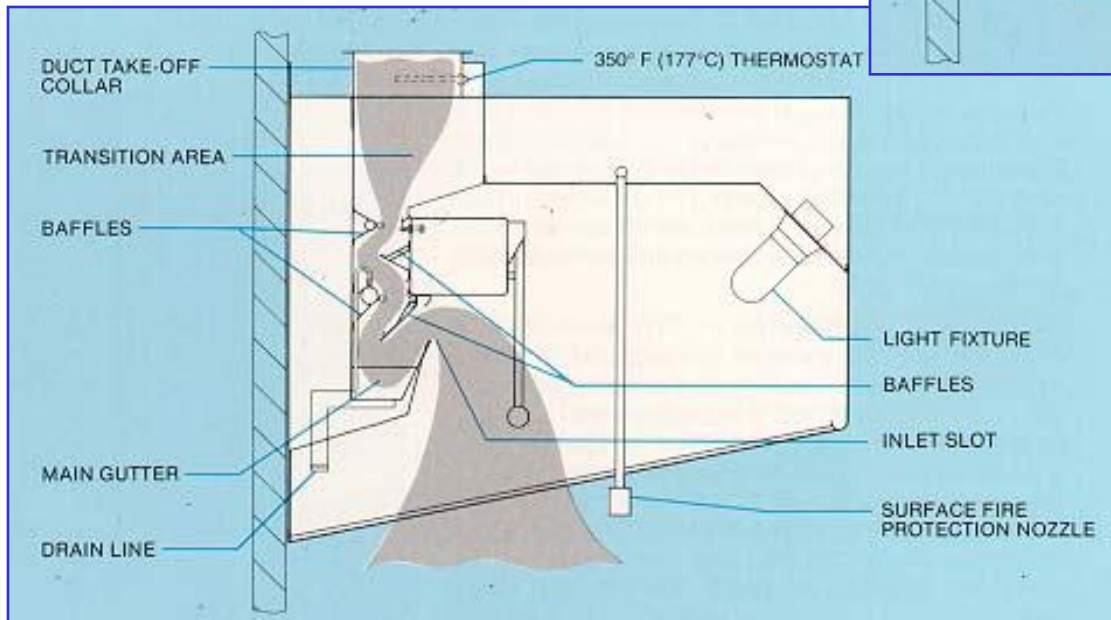
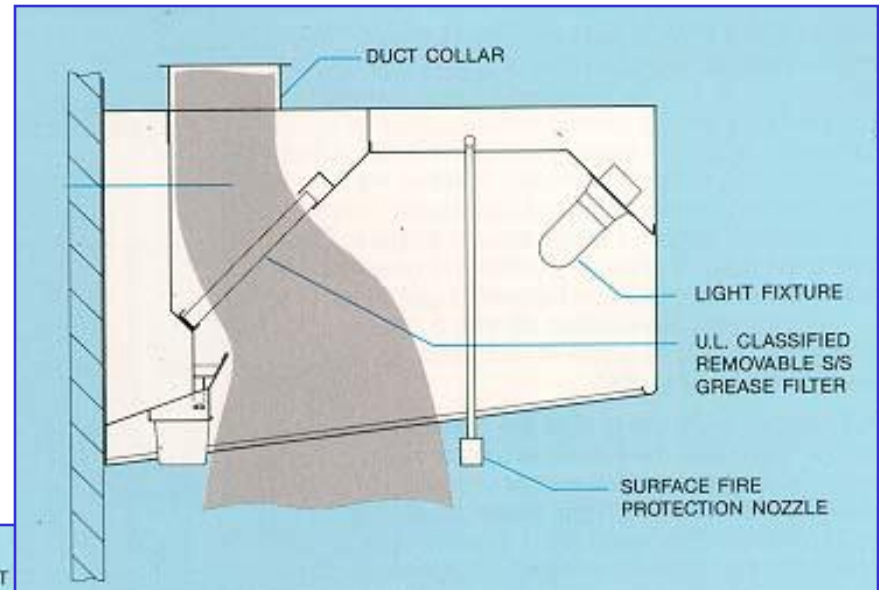
# Smoke? From Our Restaurant?



# Filter Efficiencies

*Much less than  
you think!*

## Grease Extractor



## Baffle Filter

Hood filters cannot remove submicron and grease vapor, and these components may be a major component of the effluent.

# Grease Efficiency Test Method Status

- UL 1046  
Standard for Grease Filters for Exhaust Ducts. *Does not include filter efficiency test!*
- ULC-S649-93  
Standard for Grease Filters for Commercial and Institutional Kitchen Exhaust Systems

**Grease Filter  
Efficiency Test  
May Not Be  
Representative  
of Real World!**

UNDERWRITERS'  
LABORATORIES  
OF CANADA

ULC-S649-93

STANDARD FOR  
GREASE FILTERS  
FOR COMMERCIAL  
AND INSTITUTIONAL  
KITCHEN EXHAUST  
SYSTEMS





**94% EFFICIENT AT GREASE  
EXTRACTION!**

*“The quantity of grease passing through  
the filter to the exhaust duct did not  
exceed 6% of the amount generated!”*



VS.



# U. of Minn. Study (ASHRAE)



**ASHRAE** American Society of Heating, Refrigerating and Air-Conditioning Engineers Inc.  
1791 Tullie Circle, NE • Atlanta, Georgia 30329-2305 ☎ 404-636-8400 • Fax 404-321-5478

## IDENTIFICATION AND CHARACTERIZATION OF EFFLUENTS FROM VARIOUS COOKING APPLIANCES AND PROCESSES AS RELATED TO OPTIMUM DESIGN OF KITCHEN VENTILATION SYSTEMS

**ASHRAE 745-RP  
Phase II  
Final Report**

Submitted to ASHRAE by:

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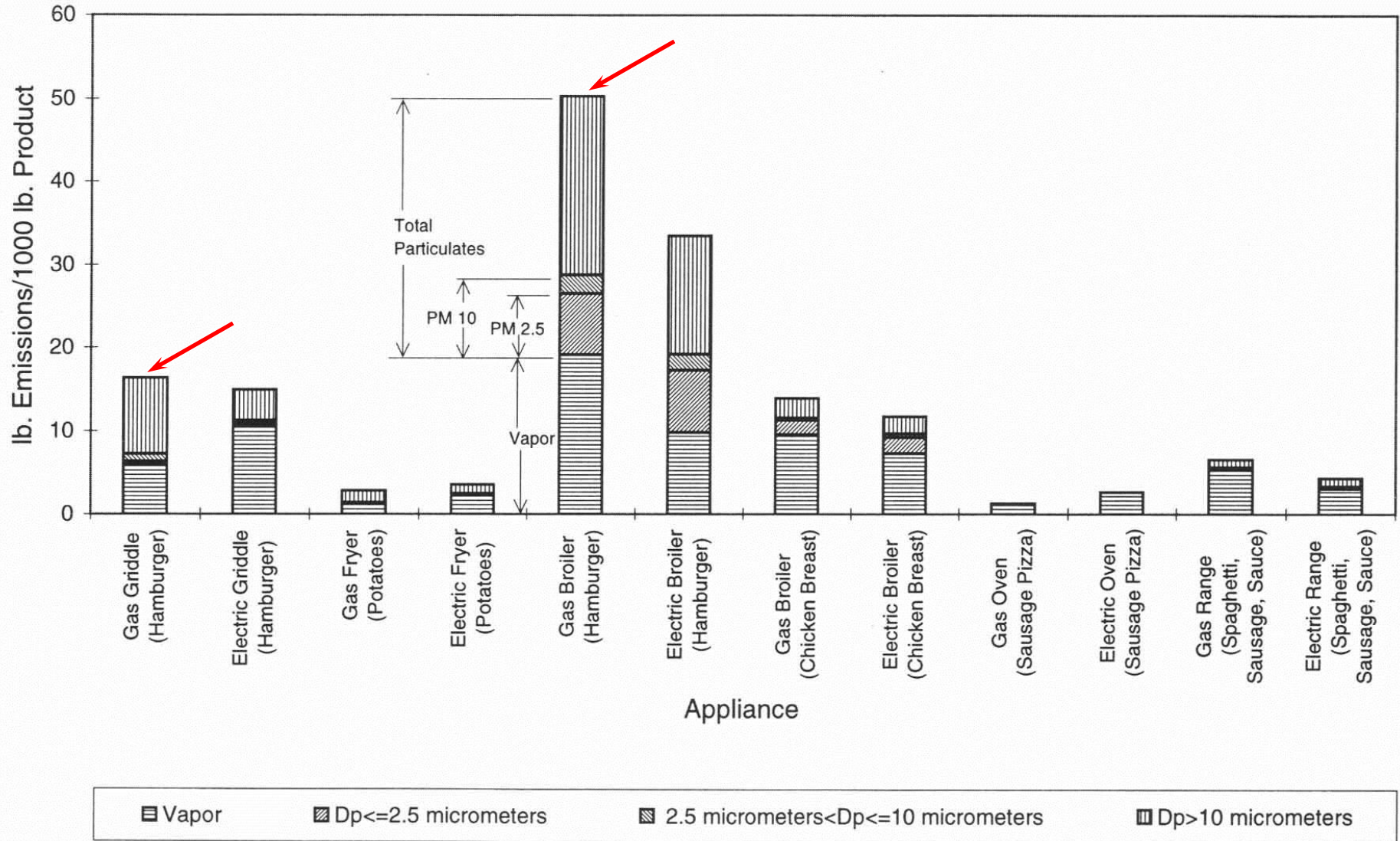
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111 Church St. SE  
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July 21, 1998  
Revised February 9, 1999

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# In-Plume Grease Measurement



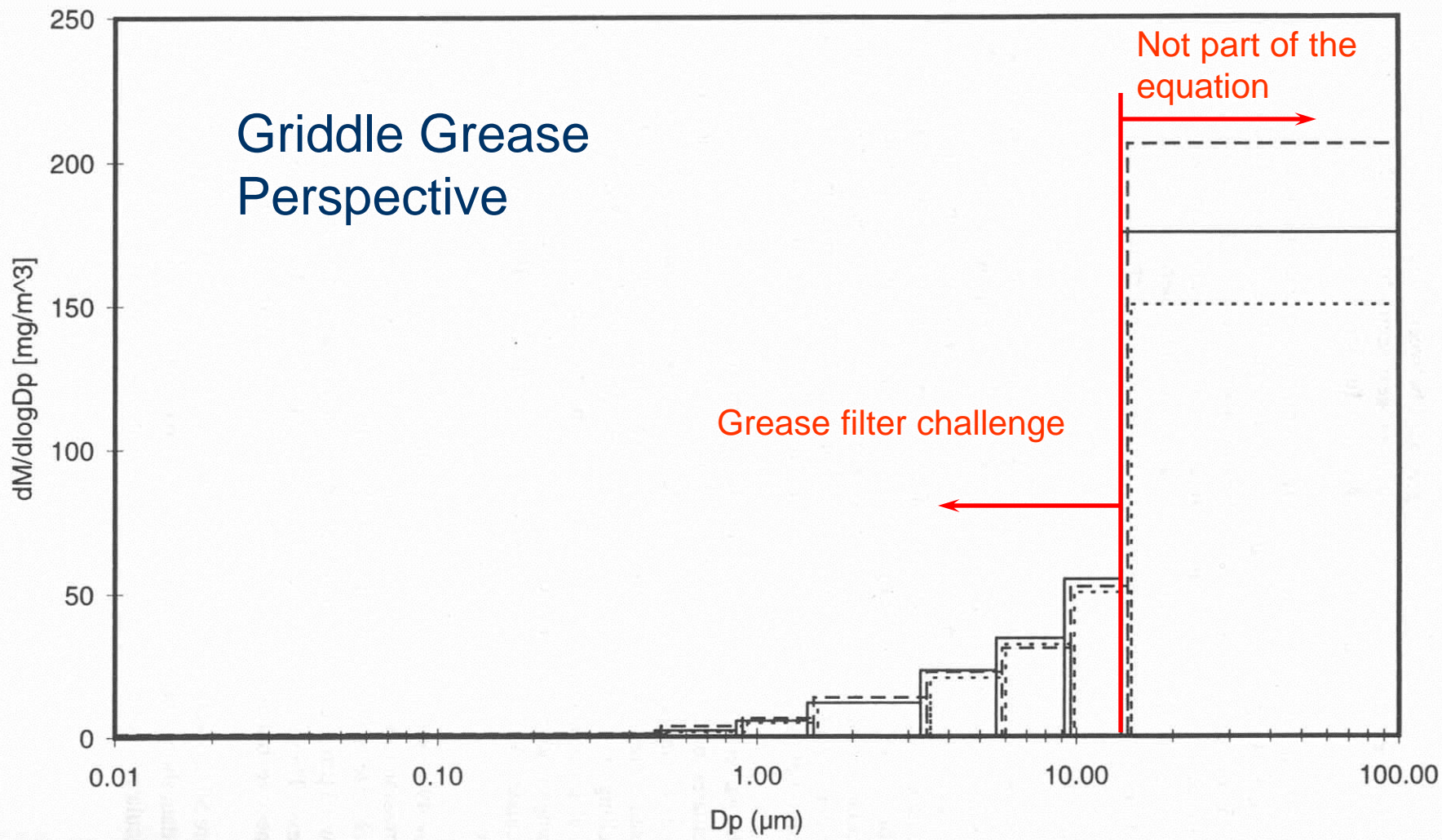


Figure 48. Gas griddle particle distribution (3 tests)

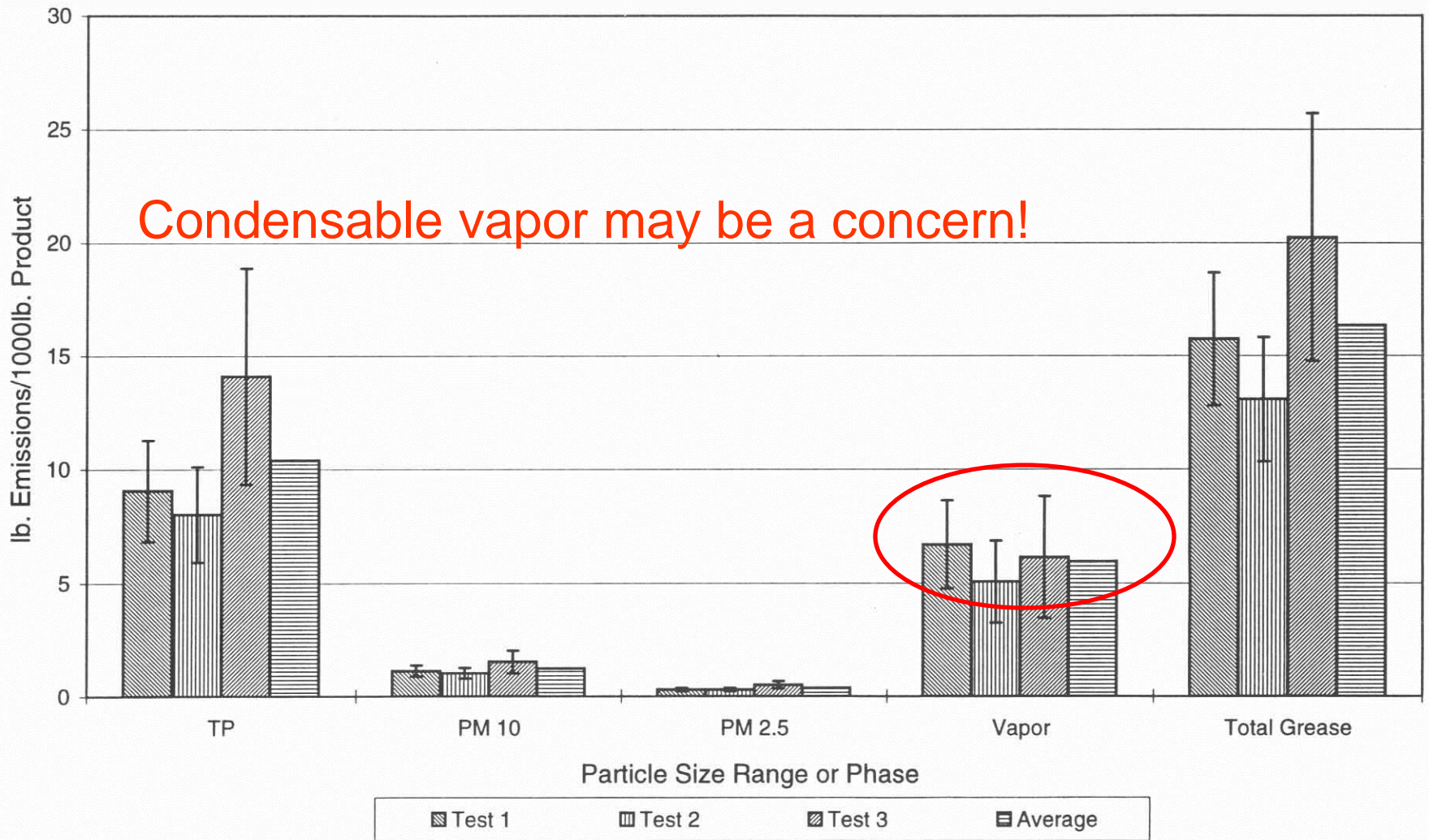


Figure 50. Gas griddle normalized grease emissions

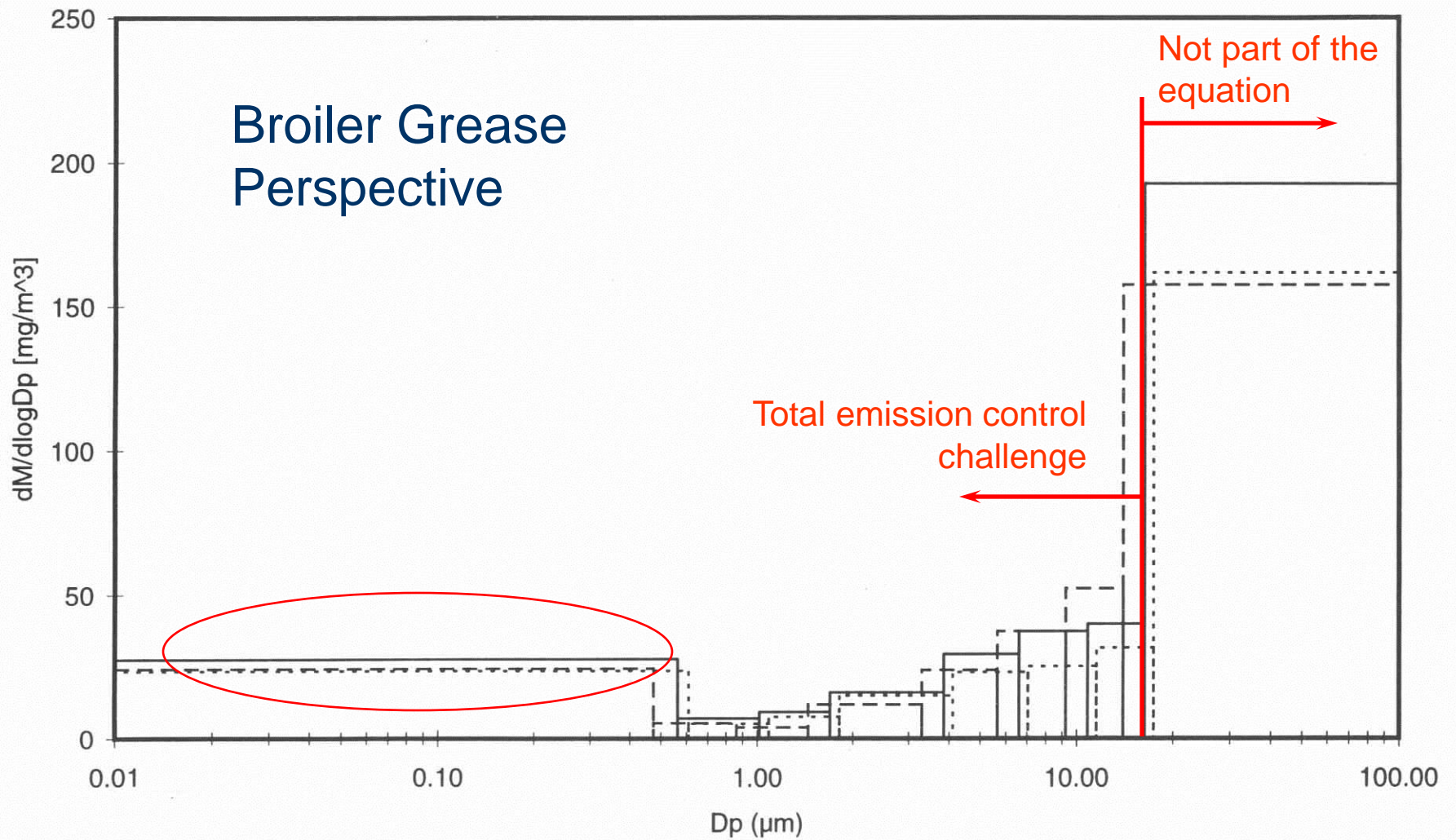


Figure 96. Gas broiler (hamburger) particle distribution (3 tests)

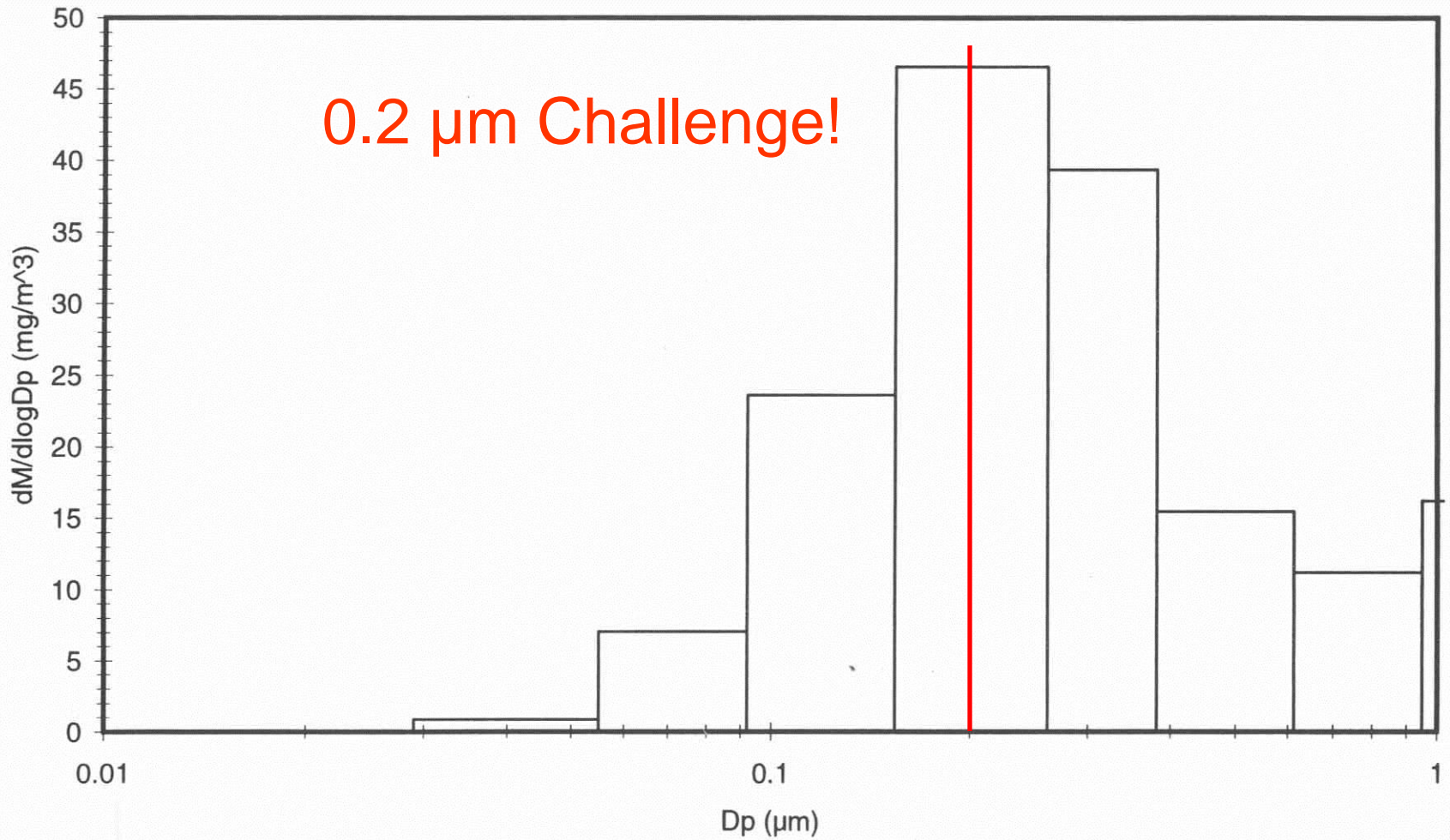
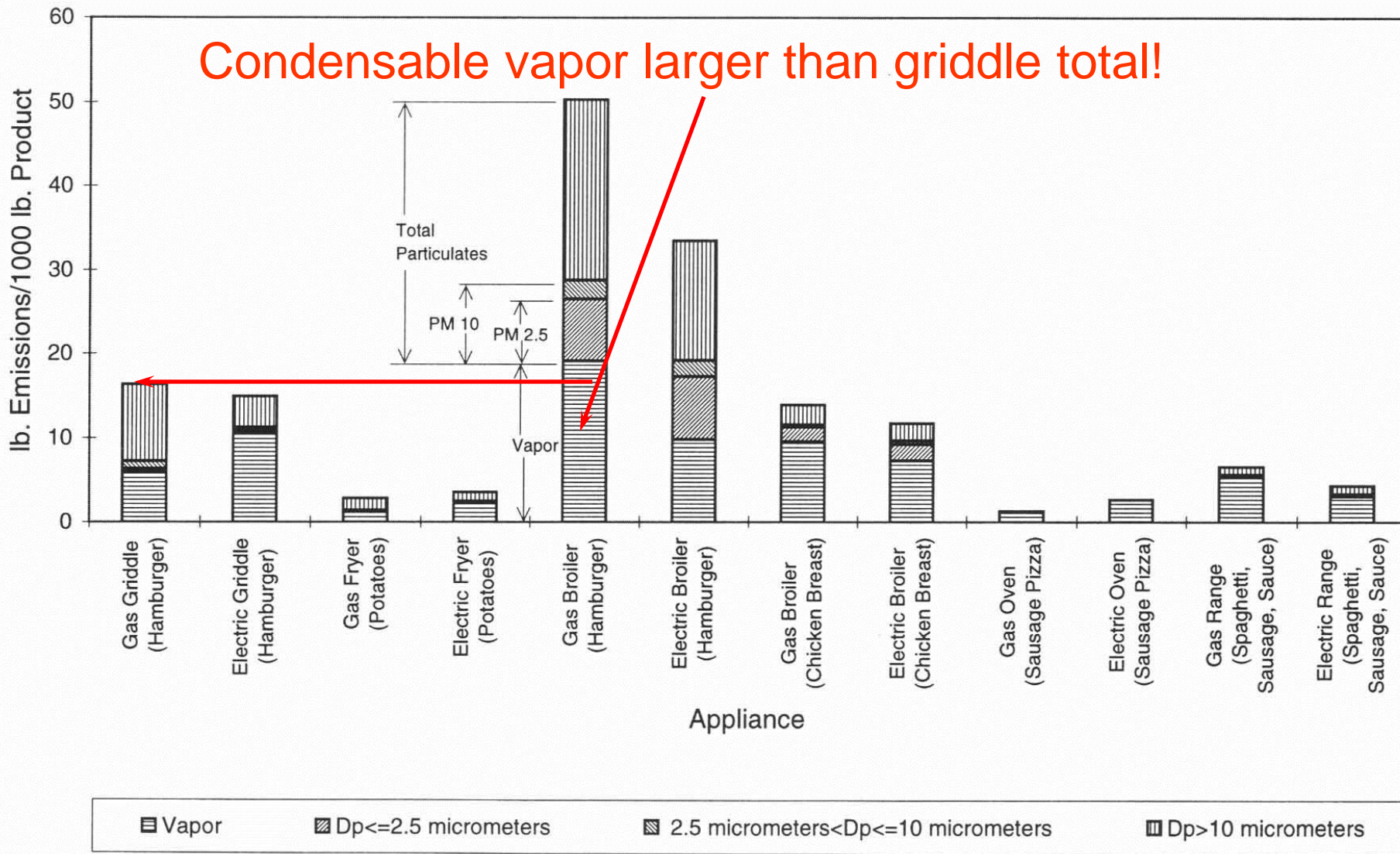


Figure 98. Gas broiler (hamburger) particle distribution between 0.01 and 1.0  $\mu\text{m}$   
Data taken with the ELPI during the cooking process at the sampling point

Condensable vapor larger than griddle total!



# New ASHRAE Research, RP-1375 (in plume measurements)

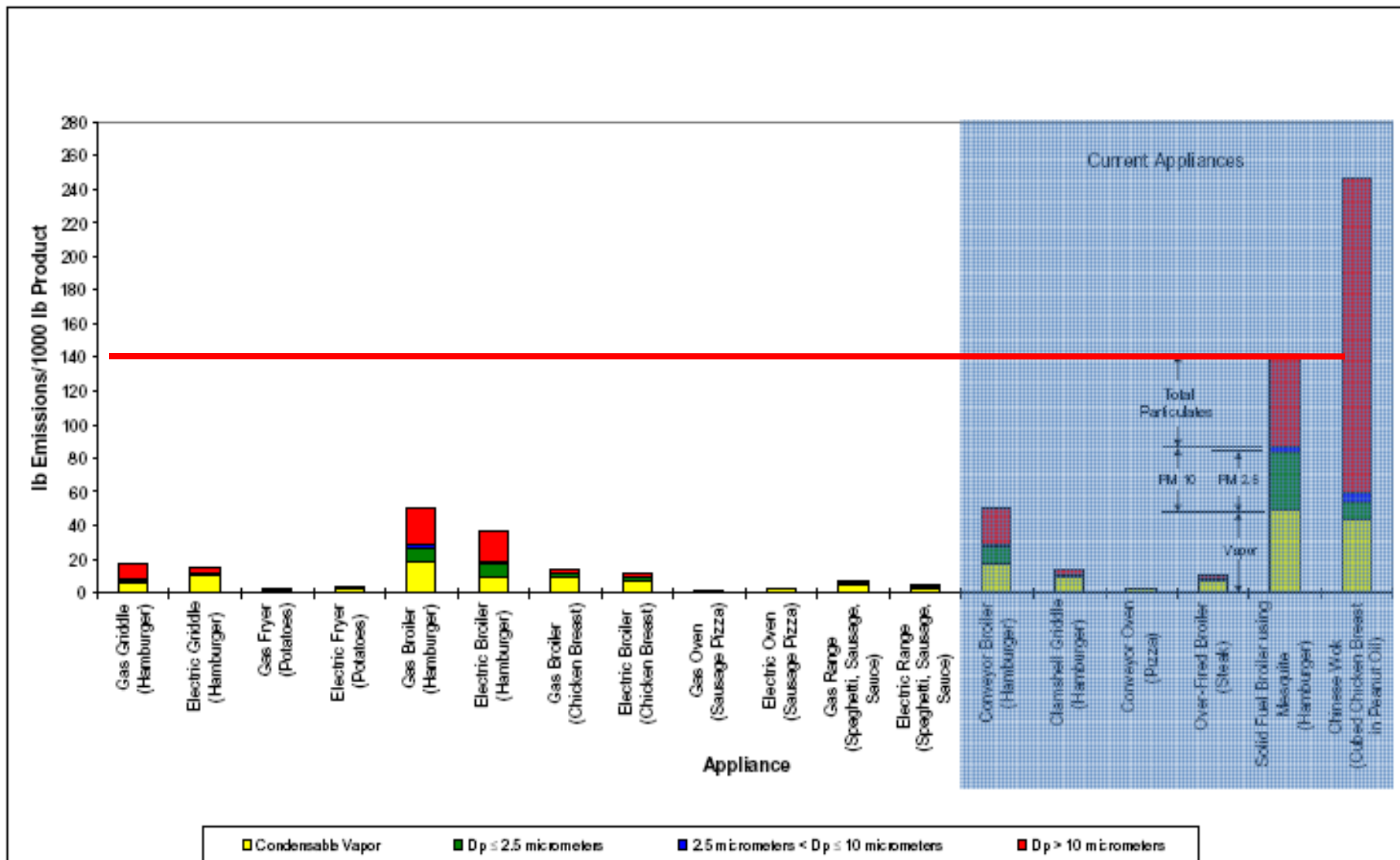


Figure 1. Comparison of normalized average grease mass emissions in the plume from six appliances tested in the present study compared with the emissions measured in ASHRAE 745-RP.

# In-Duct Grease Measurement (with basic baffle filter installed in hood)

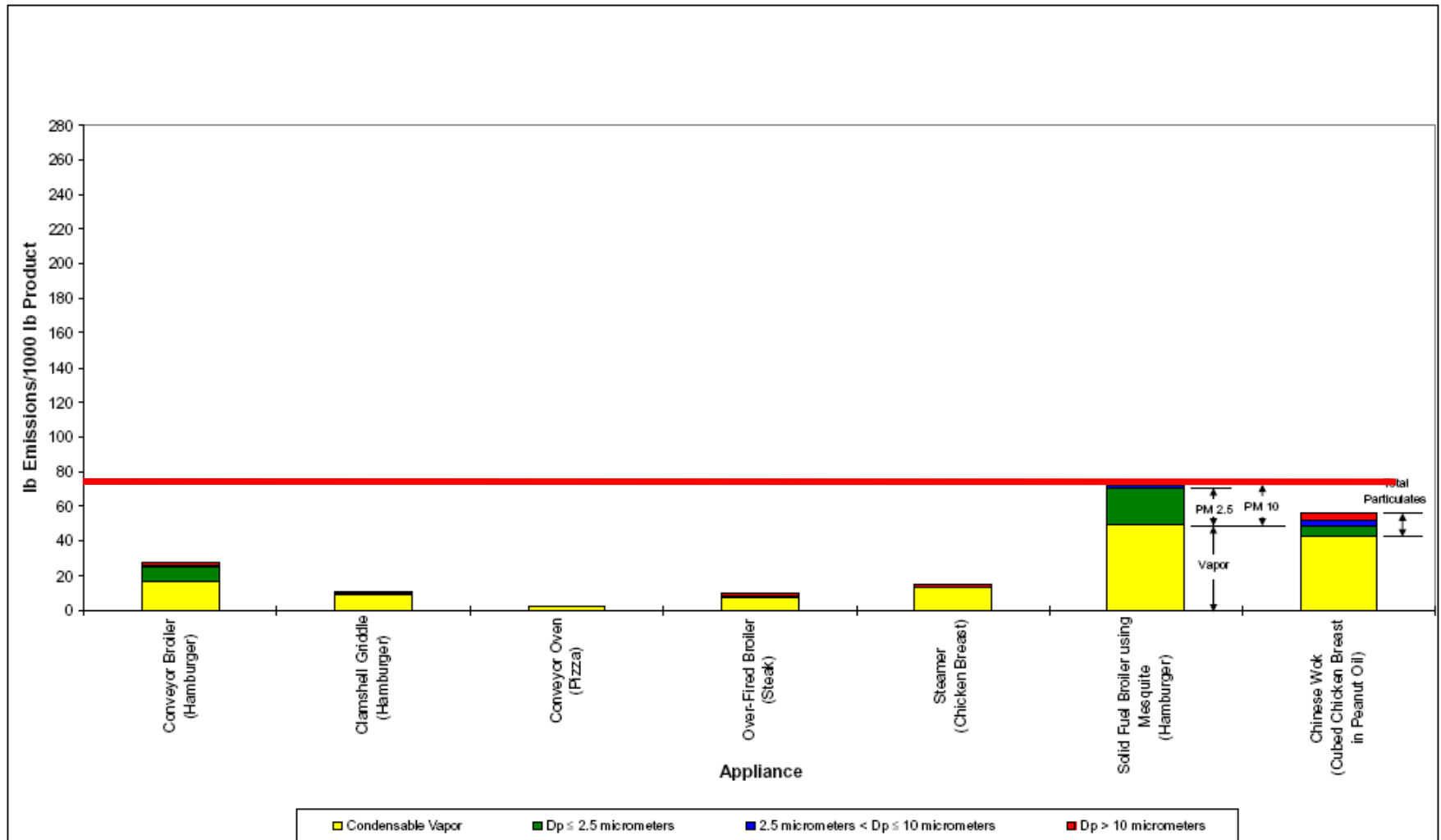


Figure 2. Comparison of normalized average grease mass emissions in the exhaust duct from the seven appliances tested in the present study.



## **Baffle Filter Efficiency:**

**140 lb produced.**

**75 lb passes through the filter.**

**Therefore:  $140 - 75 = 65$  lb removed.**

**Apparent eff. =  $65/140 = .46 \times 100 = 46\%$**

## Something wrong with this picture...



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EXTRACTION!**

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the filter to the exhaust duct did not  
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# Where Do We Stand?



# Development of a Standard Method of Test for Commercial Kitchen Effluent Grease Removal Systems

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Joshua C. Friell

Department of Mechanical Engineering

University of Minnesota

Now an official ASTM Standard Test Method

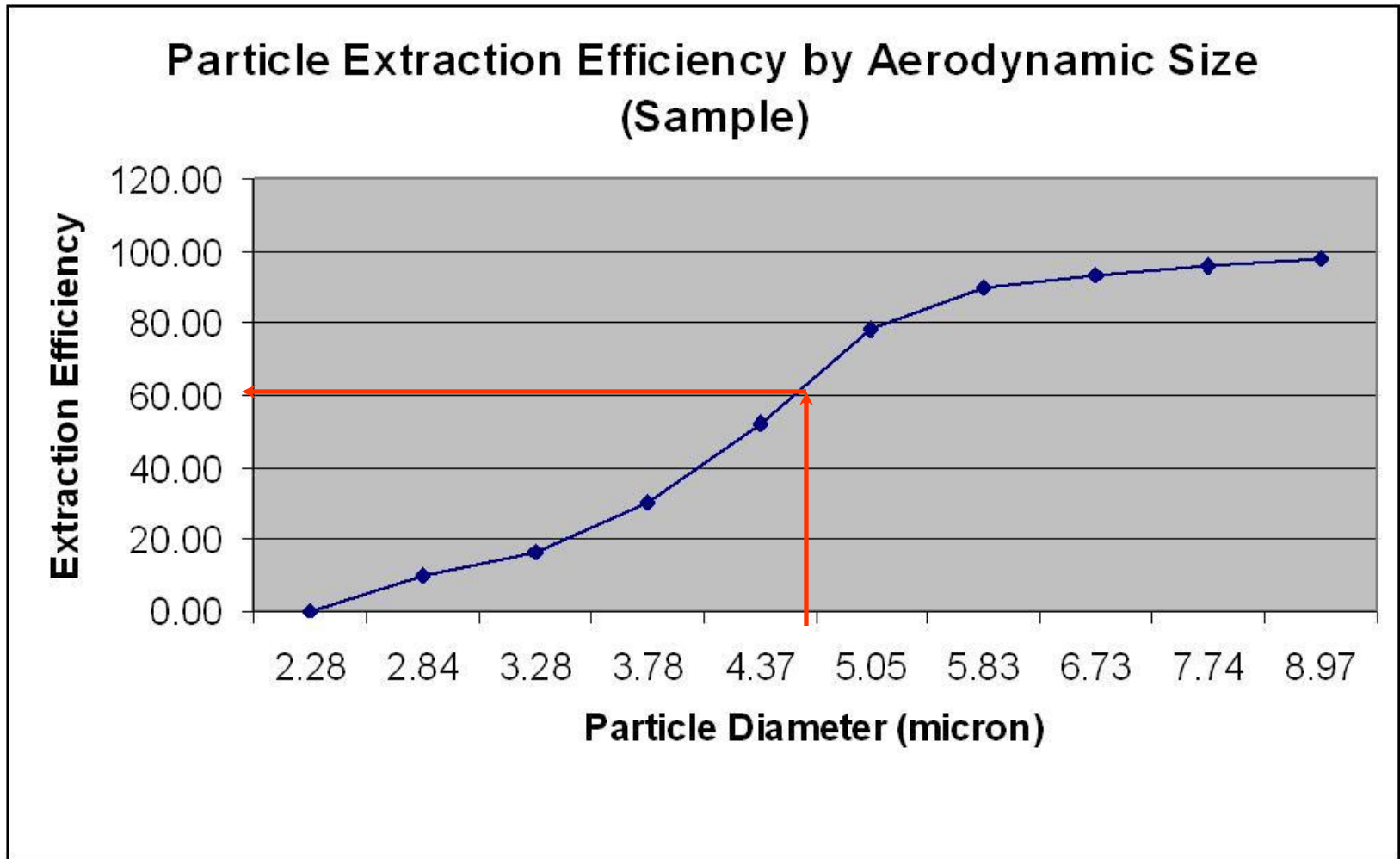
*ASTM F2519-05 Standard Test Method  
for Grease Particle Capture Efficiency of  
Commercial Kitchen Filters and Extractors*

Download Research Report at:

<http://www.fishnick.com/ckv/greasegroup/>

# Baffle Filter Efficiency vs. Particle Size

(Fractional Efficiency Curve)




Source: CE-CERT

# **Why a New Standard Method of Test?**

To evaluate (and specify) the...

# Proliferation of New Technologies

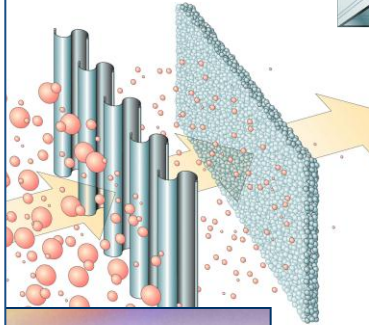


**GAYLORD**

**Ultra Vent™**  
Series Ventilators  
with UV Technology

Available on Water Wash, Cartridge  
Extractor and Filter Hoods

## Captrate's Grease-Stop Combo™



*Superior  
Grease Removal  
Efficiency.*

**Provides Ultra Clean:**

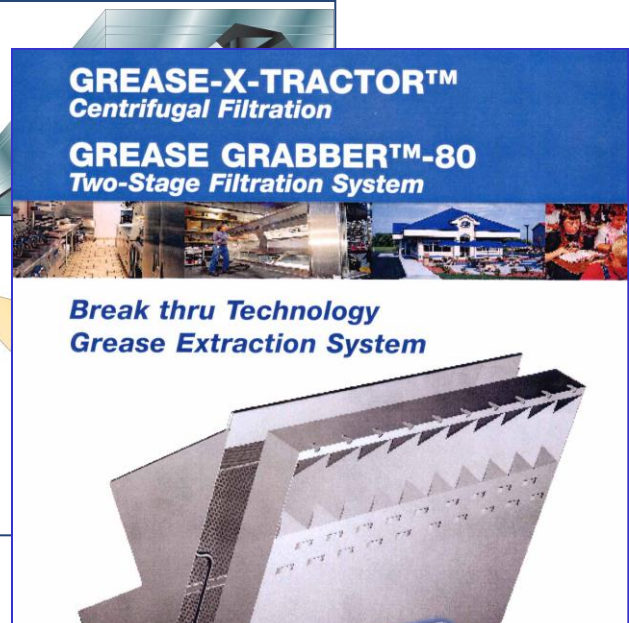
- Hood Interior
- Exhaust Duct System
- Exhaust fans
- Building Roof

**Reactocell also means:**

- No water supply
- No plumbing
- No drains
- No grease interceptors
- Reduced operating costs
- Reduced odor emissions

REACTOCELL is the FIRST application of UltraViolet technology in a kitchen exhaust system. Since its introduction Reactocell has been a breakthrough technology embraced by leading food facility designers and engineers. Vent Master is the world leader in this technology.

Reactocell tackles grease at the source right down at the molecular level. It virtually eradicates any trace of grease before it hits the ductwork and exhaust system. The result is reduced operating costs and a super efficient system that sets the standard for ventilation systems everywhere.



**GREASE-X-TRACTOR™**  
*Centrifugal Filtration*

**GREASE GRABBER™-80**  
*Two-Stage Filtration System*

*Break thru Technology  
Grease Extraction System*



Clean operation, clean benefits – that's  
Halton Capture Ray

Efficient Halton Capture Jet hoods are now available with Capture Ray ultraviolet technology. Scientifically proven results give added value in fire safety, running costs and the environment:

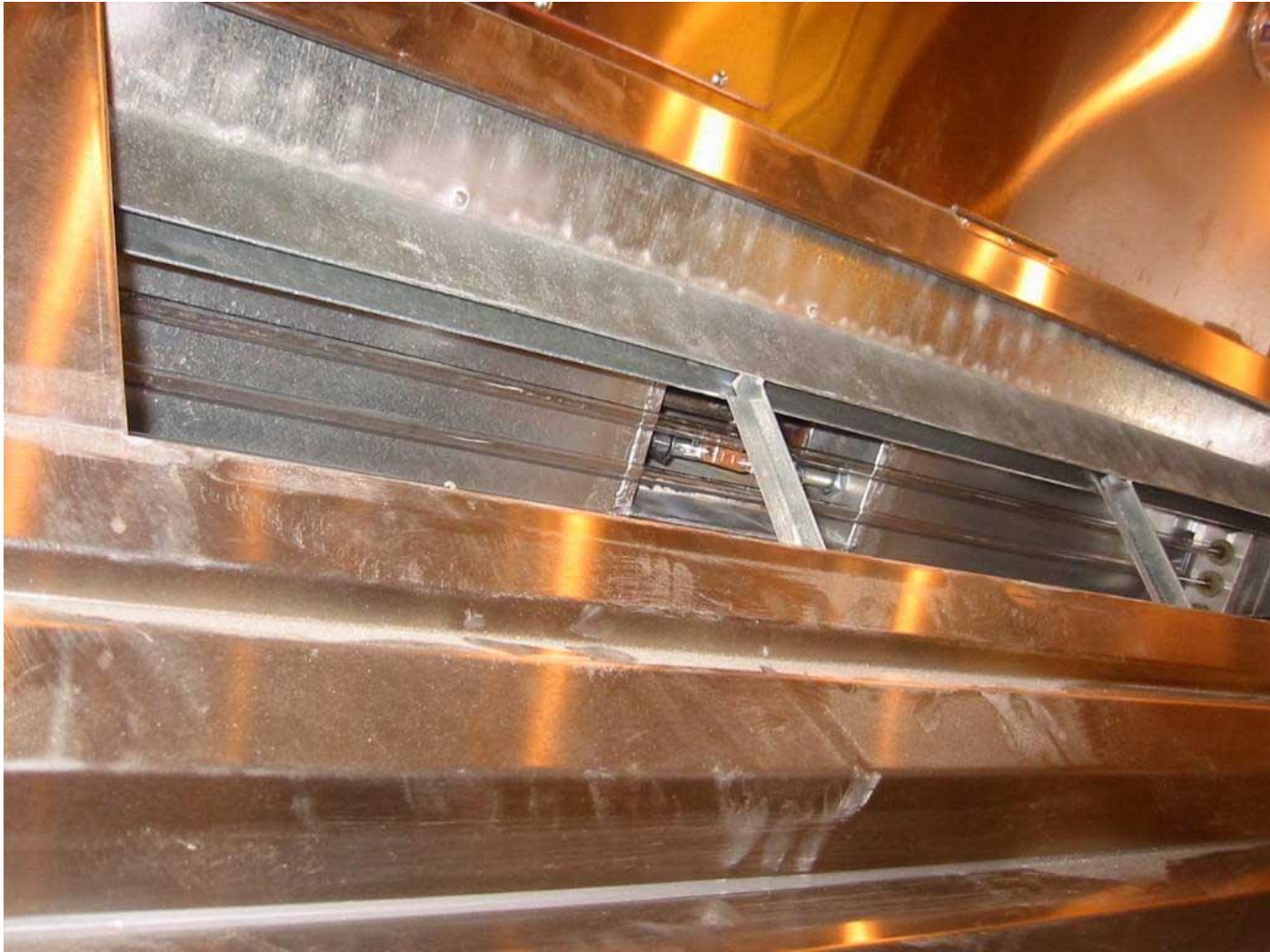
- Clean exhaust ducts and plenum
- Improved hygiene and fire safety
- Savings in operation and maintenance costs
- Environmentally friendly operation
- Comfortable working conditions

Visit our web site for more information.  
USA: [www.haltoncompany.com](http://www.haltoncompany.com)  
International: [www.halton.com](http://www.halton.com)

**We Care for Indoor Air**



# First hand look at a UV system...



It left the factory clean...



**If there is grease...**



**...we'll see it here!**



**One Month Later...**

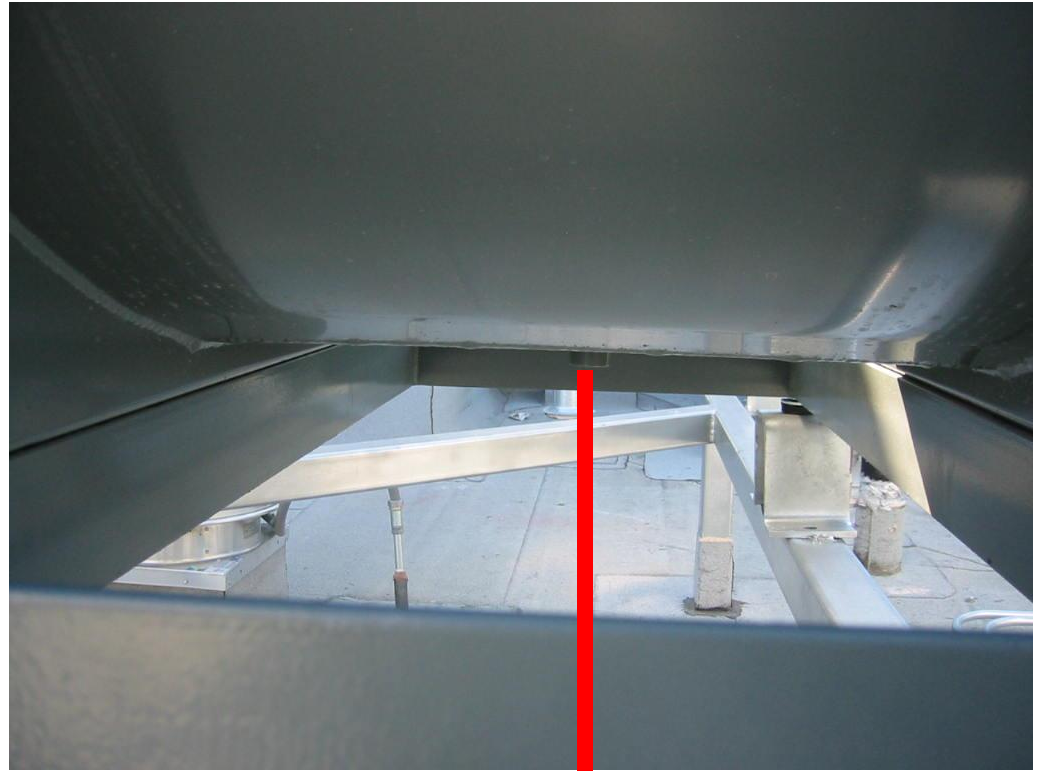
# Behind the filter!



**Below the filter!**



...and at the fan?



# But we have much to learn...

- Most manufacturers acknowledge that a UV light system is not going to remove smoke or odors from the exhaust airstream itself.
- The industry needs a test protocol for evaluating the performance of UV systems.
- Until such time, UV technology, along with competing (or complementary) technologies such as electrostatic precipitators (ESP), catalysts, water-based scrubbers, high efficiency HEPA filters, and activated charcoal/potassium permanganate modules must be critically evaluated from one project to the next.

**And it's not for everyone...**





# Restaurant Fix for UV!



**But the Charbroiler problem...**





**...is Real!**