

Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources*. AP42 is located on the EPA web site at [www.epa.gov/ttn/chief/ap42/](http://www.epa.gov/ttn/chief/ap42/)

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# SMITH-EMERY COMPANY

CHEMISTS • TESTING • INSPECTION • ENGINEERS

781 EAST WASHINGTON BOULEVARD

LOS ANGELES 21, CALIFORNIA

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FILE NO.: 3174-68  
 LABORATORY NO.: C-541358

DATE: JANUARY 17, 1968

SOCONY MOBIL OIL  
 150 EAST 42ND STREET  
 NEW YORK, NEW YORK  
 ATTN: MR. J. F. DUNWIDDIE

"TREE HEAT"

REPORT OF DETERMINATIONS

"TREE-HEAT"

IN ACCORDANCE WITH YOUR REQUEST, THE SPECIMEN OF BRIQUETTE MATERIAL WHICH YOU SUBMITTED TO US DECEMBER 8, 1967, MARKED AS SHOWN ABOVE, WAS TESTED TO DETERMINE THE AMOUNT OF SOLID CARBONACEOUS MATTER THAT WAS EMITTED WHEN THE SPECIMEN WAS BURNED.

THE SPECIMEN WAS IGNITED AND BURNED UTILIZING A HOOD AND STACK ARRANGEMENT AS DETAILED ON THE ATTACHED SKETCH. THE SAMPLING WAS CONDUCTED FOR A ONE HOUR PERIOD AND WAS INITIATED IMMEDIATELY AFTER THE IGNITION OF THE SAMPLE AND THE PLACEMENT OF THE HOOD OVER THE SAMPLE.

THE SAMPLING WAS CONDUCTED BY THE IMPINGEMENT TECHNIQUE USING WATER AS THE IMPINGEMENT MEDIUM. A CHAIN OF THREE WET IMPINGERS FOLLOWED BY A DRY IMPINGER AND THEN A PAPER EXTRACTION THIMBLE WAS USED TO CAPTURE THE EMISSION. UPON COMPLETION OF THE ONE HOUR SAMPLING PERIOD, THE IMPINGEMENT MEDIUM WAS TESTED FOR BOTH CARBON TETRACHLORIDE SOLUBLE AND INSOLUBLE MATERIAL AS PER THE RECOMMENDED PROCEDURES OF THE AIR POLLUTION CONTROL DISTRICT OF THE COUNTY OF LOS ANGELES.

THE VELOCITY MEASUREMENTS WERE OBTAINED BY THE USE OF AN ANEMOMETER. BELOW, PLEASE FIND A TABULATION OF THE DATA OBTAINED.

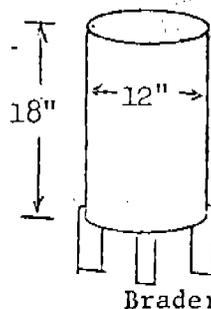
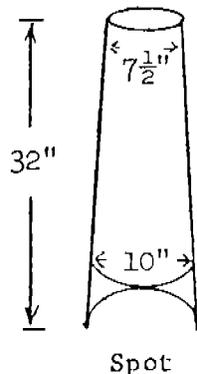
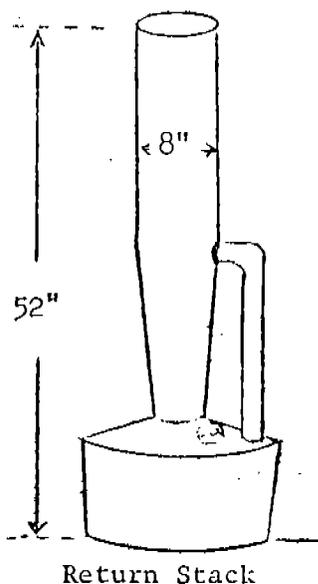
TIME MEASURED	TEMPERATURE DEGREES FAHRENHEIT	APPARENT VELOCITY FT./MIN.	TEMPERATURE CORRECTION FACTOR	CORRECTED VELOCITY FT./MIN.
2:52 PM	193	584	1.1099	648
2:55	367	480	1.2491	600
3:00	330	430	1.2209	525
3:05	292	418	1.1911	498
3:10	292	390	1.1911	465
3:15	180	300	1.0988	330
3:20	173	320	1.0928	350
3:25	173	310	1.0928	339
3:30	193	320	1.1099	355
3:35	203	318	1.1184	356
3:40	200	318	1.1158	355
3:45	204	328	1.1192	367
3:50	206	332	1.1209	372
AVERAGE	231	373		428

# Engineer's Notebook

October 2, 1969

## ORCHARD HEATER PERFORMANCE TEST

Last year ten different orchard heaters were tested at Washington State University for radiant heat output. Of those tested, the conventional return stack, the Brader Heater, and the Spot Heater are the only ones available in California.



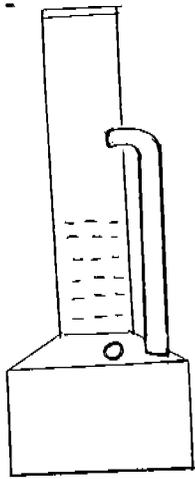
The heat output is as follows:

<u>HEATER</u>	<u>OPERATING LEVEL</u>	<u>FUEL RATE gal/hr</u>	<u>HEAT INPUT BTU/hr</u>	<u>RADIANT FRACTION %</u>
Return Stack	3 holes	1.253	177,987	39.5 %
	2 holes	0.550	78,046	34.5 %
	1 hole	0.338	48,067	33.9 %
Brader	150 psi	0.659	93,648	25.2 %
	125	0.607	36,193	26.6 %
	100	0.538	76,354	29.9 %
Spot	200 psi	0.844	119,833	21.8 %
	160	0.784	111,343	21.7 %
	120	0.699	99,332	21.8 %

Although the good old Return Stack stood out over the others, the Washington people are beginning to feel that radiant heat fraction is over-rated, particularly in deciduous orchards. Who knows, we Californians might even convince them that wind machines can work.

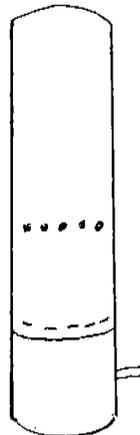
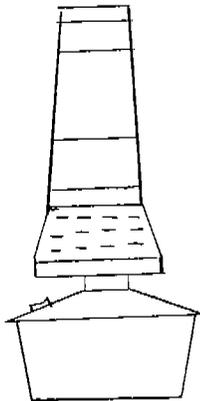
Robert A. Parsons  
Extension Agricultural Engineer

Universi Return Stack  
 Hy-Lo Return Stack  
 Universal



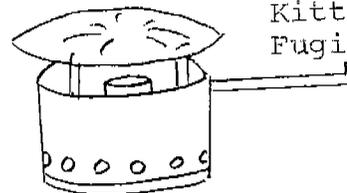
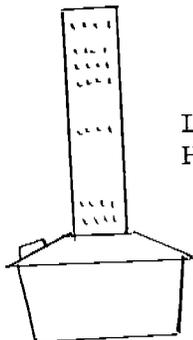
Spot Heater

Jumbo Cone  
 Hy-Lo Large Cone  
 Jumbo



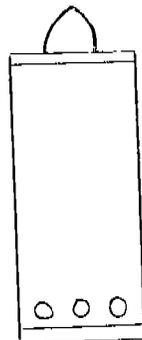
Masco Heater

Lazy Flame  
 Hy-Lo 230-A Lazy Flame

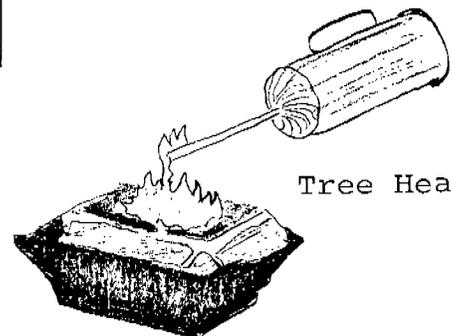


Pipeline systems (propane,  
 Kittle  
 Fugit  
 oil, and  
 natural gas)

All 3 above may be  
 pipeline modifications



Briquet  
 Coke



Tree Heat

This publication is a cooperative effort of the Air Pollution Control District, Farm Bureau, Fruit Growers Laboratory, and Agricultural Extension.

R. M. Burns  
 Farm Advisor

To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products which are not mentioned.

PARTICULATE EMISSIONS OF ORCHARD HEATERS IN GRAMS/MIN

Fuel lb./hr.	Oper. Pr. psi	Masco*	Doubleco	Sheu*			Mobil Oil Tree Heet*
				Return Stack	Large Cone	230-A	
2.5				BHM	BHM	.06	
3.0				"	.04	.06	
3.5				.02	.03	.06	
4.0				.02	.03	.07	
4.33	50	.045					
4.5				.02	.03	.15	
5.0			.25	.03	.03	.24	
5.5				.04	.04	.5	
5.67	75	.033					
6.0			.65	.04	.05	.7	
6.5			1.0 or >	.05	.17	.9	
6.84	125	.057					
7.0				.07	.2	1.1	
7.5				.18	.4	AHM	
8.0				.37	.7	AHM	

.38\*\*

\* Masco - By UC Riverside  
 Sheu - By UC Davis  
 Tree Heet - By Smith-Emery  
 \*\*Solid Block (no fuel control)

BHM - Below Heater Minimum

AHM - Above Heater Maximum