

HEAT SOURCES

**QUESTION #1: WHAT KIND OF HEAT SOURCES WILL RJR BE
ABLE TO SUPPLY TO JTI?**

ANSWER PREPARED BY:

**SAM THOMASSON
DATE: JULY 11, 1990**

51225 3286

HEAT SOURCES

**QUESTION #1: WHAT KIND OF HEAT SOURCES WILL RJR BE
ABLE TO SUPPLY TO JTI?**

- ° **Internal holes or external grooves**
- ° **Minimum of 6% CMC binder**
- ° **Maximum of 30% tobacco inclusion**
- ° **No post baking**

HEAT SOURCE

QUESTION #2: WHAT ARE THE CHARACTERISTICS OF THE HEAT SOURCE AS REGARDS:

- 1. BURNING TEMPERATURE**
- 2. DELIVERY PATTERN OF EACH SMOKE COMPONENT**
- 3. MECHANICAL STRENGTH**
- 4. HYGROSCOPICITY**
- 5. LIGHTABILITY**

ANSWER PREPARED BY:

**W. J. CASEY, Ph.D.
DATE: JULY, 1990**

(COMMON)

SMOKING DATA FROM --- 50cc/30sec

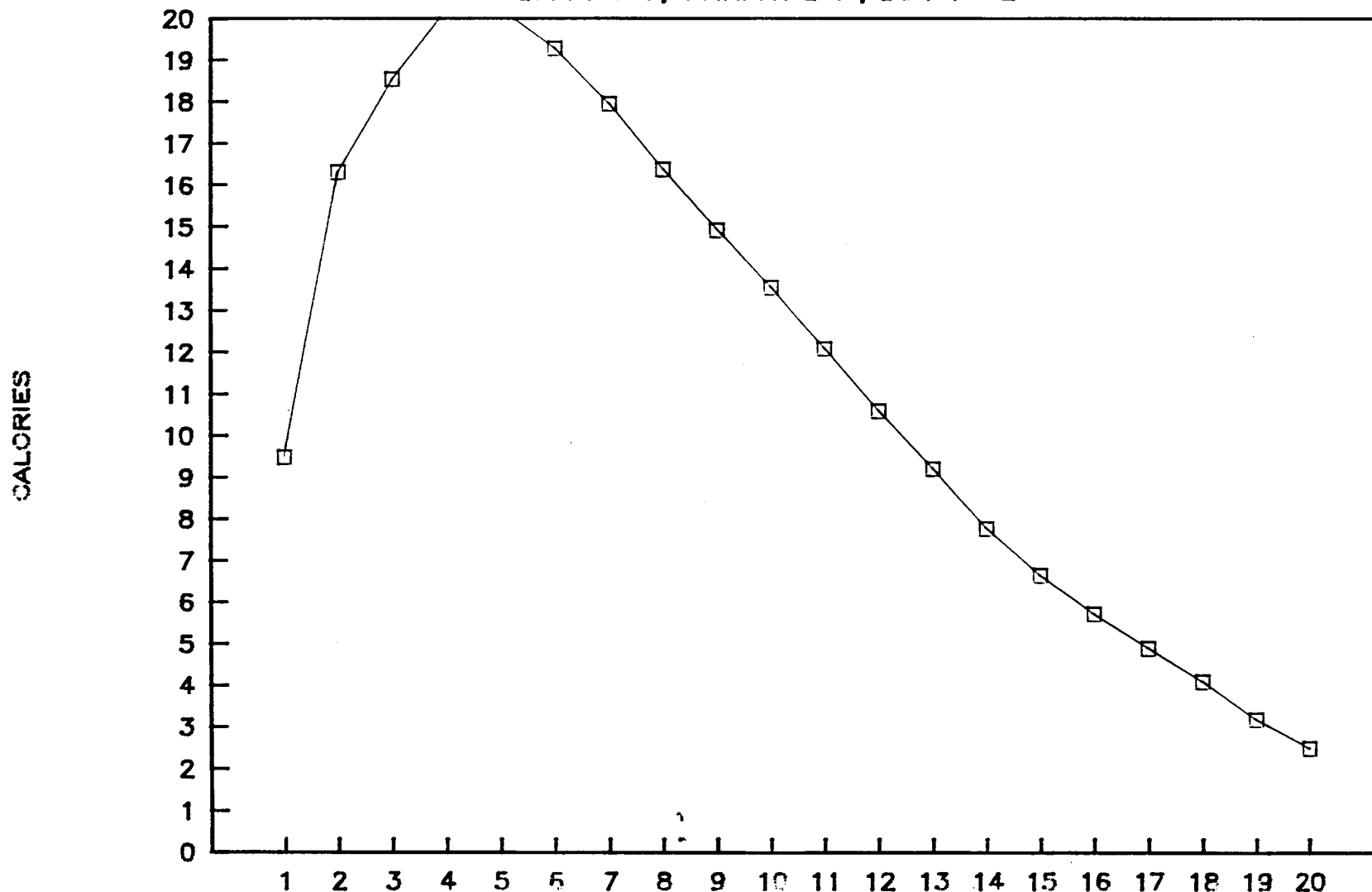
VARIABLE: HEAT SOURCE
SUBSTRATE: ALUMINA:: CST-5
MEP: NONE
JACKET: ALL "C" GLASS; 8 MM PRE-BURN BACK
DATE: 4/4/1990

ID	# OF SLOTS	# PUFFS	-- 50cc/30sec -- TOTAL CO (MG)	-- TOTAL CO2 (MG)	TOTAL PUFF CALORIES	RATIO CO/CO2
413-2 COMMON LOT 4/90	6	20	33.6	94.2	233	0.3567

ID	PUFFS WHEN DENSITY >2000	ON WHAT PUFF # HIGHEST DENSITY	VALUE OF HIGHEST DENSITY	PUFFS WHEN P.D. > 550	ON WHAT PUFF # HIGHEST P.D.	VALUE OF HIGHEST P.D.
413-2 COMMON LOT 4/90	6-14	9	7058	NONE	3-7	543

CALCULATED CALORIES --- 50cc/30sec

6 SLOT+1 C.H.; COMMON LOT ; BOX413-2



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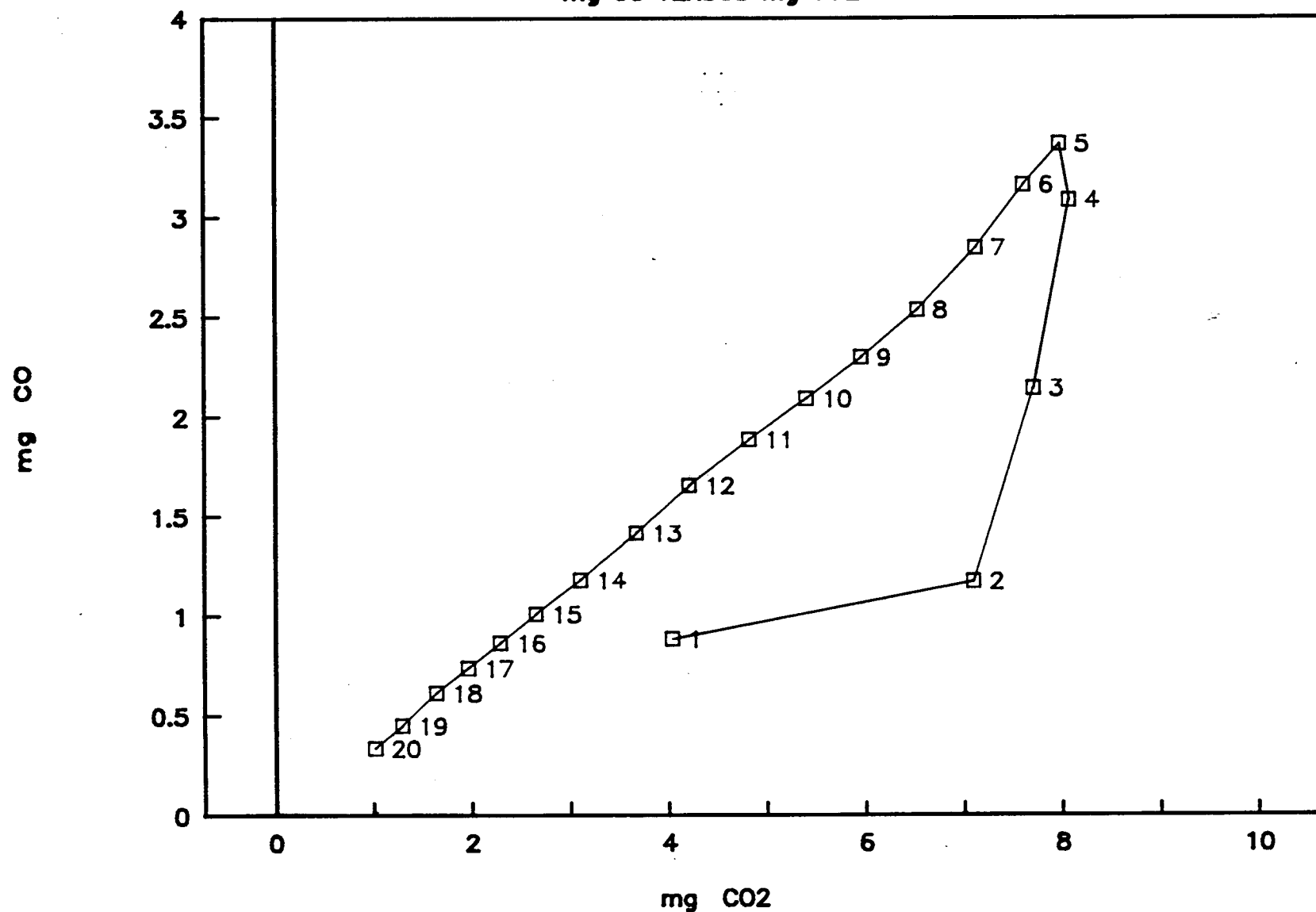
□ PUFF CALORIES = 233

+ CO = 33.6 mg

◆ W. CASEY ::4/4/90

SMOKING --- 50cc/30sec

mg CO VERSUS mg CO2



□ 6 SLOT--BOX 413_2

+ PUFF CAL = 233

◇ W. CASEY ::4/4/90

The heat source pilot plant can produce a wide variety of heat source configurations using either internal holes or external grooves. All heat sources contain a minimum of 6% CMC binder by weight and a maximum of 30% tobacco powder by weight. All heat sources are green (no post baking) due to machinability and taste implications.

3. **Puff by Puff calorie curves.**
4. **2 curves of CO vs CO₂.**
5. **Moisture content of 7 different 5-slot heat sources. (These address question of hygroscopicity.)**

A summary table of information on 5 different 4-slot heat sources. Comments of lightability and taste on these heat sources (Lightability testing methods are still under investigation.) Puff by puff calorie curves and 2 plots of CO versus CO₂.

Three typical plots of puff by puff yields are attached. One for WTPM; one for nicotine; one for glycerin. All plots contain data for 6-slot, 5-slot and 4-slot heat sources.

Also attached are two memos prepared by Dr. Riggs.

They summarize performance characteristics of various heat source designs that have been undergoing evaluative analysis. The first memo

Data on the 6-slot heat source used in cigarette K-301 is attached in the section "Latest Improved Product", Question #4.

Data in this section, on 6-slot heat sources, includes:

- 1. A puff by puff calorie curve, at 50 cc/30 sec smoking of Common Lot #413-2.**
- 2. A summary data Table on fuel 413-2.**
- 3. A plot of CO vs. CO₂ for fuel 413-2.**
- 4. A data table, including mechanical strength, for a large batch (935,000) of 6-slot heat sources, Boxes 528-535.**

Data on 7 different 5-slot heat sources are included:

- 1. Pictorial definition of terms.**
- 2. Table with summary of data.**

entitled "Performance Analysis of Cigarettes Incorporating Various Heat Source Types: summarizes performance attributes of 4 heat source designs in a described cigarette configuration. The heat sources studied included a baked ELF (Easy Lighting Fuel) with no tobacco added, a baked ELF impregnated after baking with tobacco extract, an unbaked "keyhole" heat source (similar to a slotted heat source) with 15% Camel Lights tobacco added, and an unbaked "Keyhole" heat source with no tobacco added. The second memo entitled "Effect of Puff Volume on Alpha Cigarette Performance" summarizes performance of an unbaked 6-slotted heat source (current standard heat source) in a reference cigarette configuration smoked under several different smoking routines. From these two memos, a good understanding of how the current generations of heat sources perform can be obtained.

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- **Burning temperature is addressed with puff by puff calorie curves for 6-slot, 5-slot and 4-slot heat sources.**
 - **Graphs on puff by puff yields of WTPM, nicotine and glycerin are included.**
 - **Mechanical crush strength is 149 lbs. for 6-slot heat sources which contain 10% tobacco and 6% CMC.**
 - **Heat source moisture pick up varies as a function of the tobacco content: when tobacco range was 0-30%; moisture range was 4.2-6.4%.**
 - **Lightability is still more difficult than a cigarette but easier than Premier.**