III. RESULTS AND DISCUSSION

A. Total Liquid Yield

The opposite Table I summarizes the yield and operating data for Run 51 together with similar data for previous runs at Montebello and Tulsa on this same catalyst.

It is evident from this tabulation that Run 51 showed the customary, rapid decline in yield during the first 100 hours. After this period yields declined at a much lower and substantially linear rate.

This is illustrated in the **following** Figure 1 which shows the total liquid yield on a Brownsville design feed basis, plotted against the average age of the catalyst.

The yield shown for Run 51 was obtained under maximum bed depth conditions on a basis equivalent to the use of three reactors at Brownsville. The yields shown for Montebello Run 49 and Stanolind Run D-201-29 correspond to the use of maximum bed depth on a basis equivalent to the use of two reactors.

All of these runs show a rapid initial decline in yield during the first 100 hours followed by a substantially linear decline amounting to 1 or 2 per cent per 100 hours. The initial decline is smaller in the high yield operation of Run 51

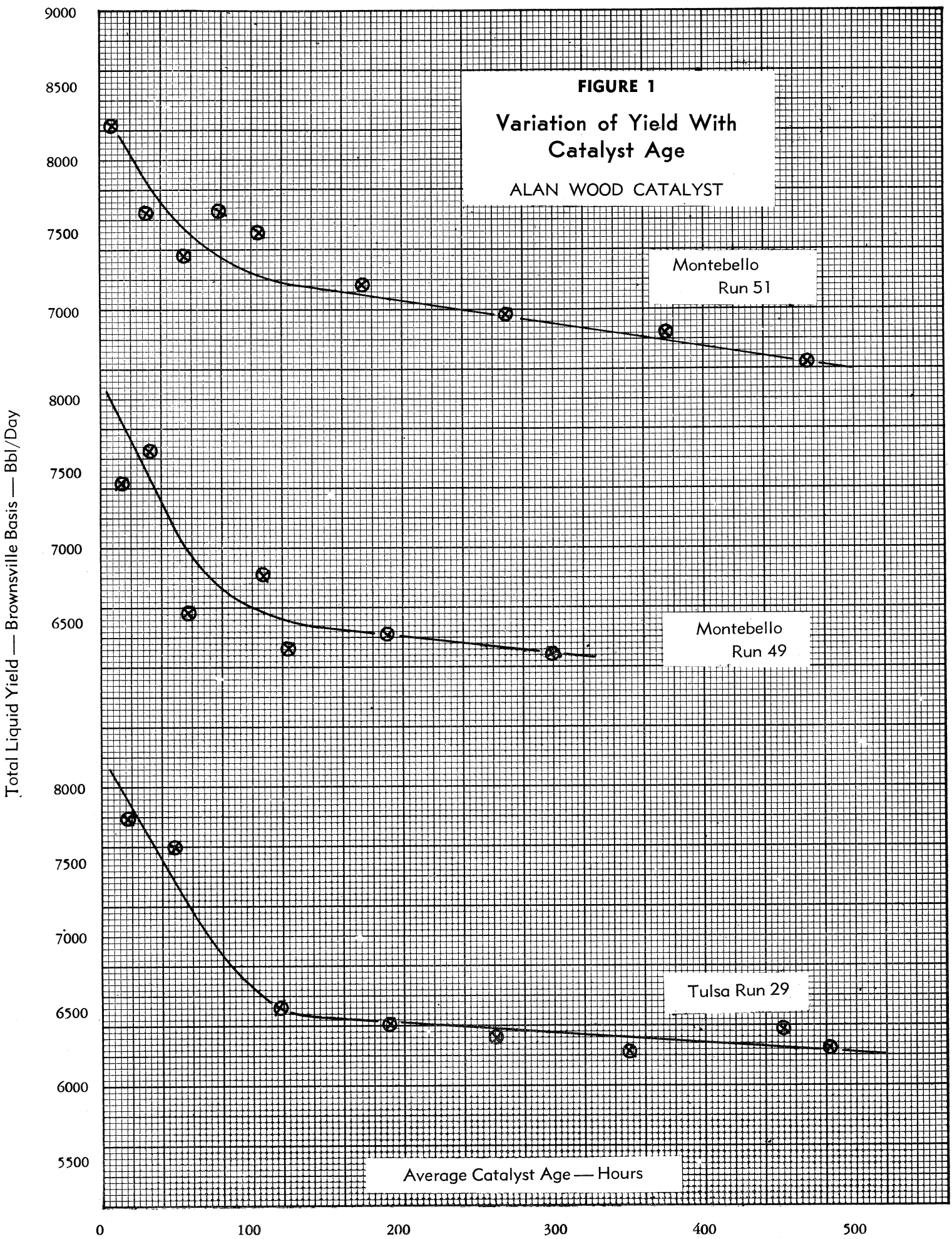
FIGURE 1
Variation of Yield With Catalyst Age
ALAN WOOD CATALYST
Montebello Run 51
Montebello Run 49
Tulsa Run 29
Total Liquid Yield — Brownsville Basis — Bbl/Day
Average Catalyst Age — Hours
9000
8500
8000
7500
7000
8000
7500
7000
6500
8000
7500
7000
6500
6000
5500
0
100
200
300
400
500

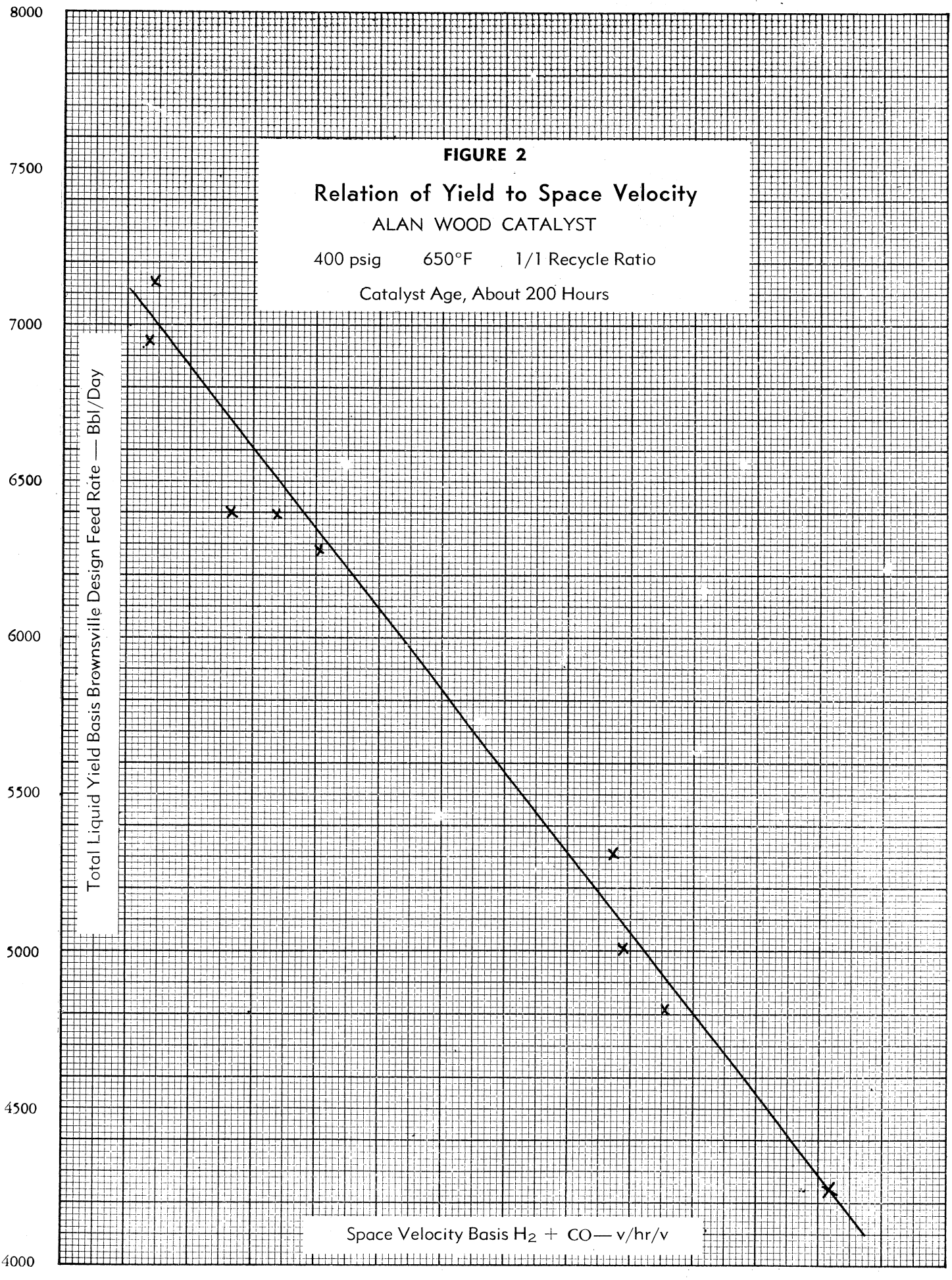

FIGURE 2

Relation of Yield to Space Velocity

ALAN WOOD CATALYST

400 psig 650°F 1/1 Recycle Ratio

Catalyst Age, About 200 Hours

(about 15 per cent) than in the lower yield operations of Runs 29 and 49 where it amounted to about 20 per cent.

The yield data for Montebello Runs 46, 48, 49, and 51 and for Stanolind Run D-201-29 are plotted against space velocity in the opposite Figure 2. The data points represent catalyst age values of 137 to 298 hours and indicate a linear relationship between total liquid yield and space velocity.

A direct comparison of Runs 51-1 and 49-1 is given in the following tabulation:

Run No.	51-1	49-1
Catalyst Age, Hours	174	192
Fresh Feed Rate, MCFH	10.2	15.4
Recycle Ratio	1.07	1.01
Bed Depth, Ft.	21.7	21.0
Space Velocity, v/hr/v	683	1074
Conversion, % of H_2 + CO Fed	85.6	78.0
Selectivity, C_{3+}/C_{1+}, %	82.9	82.3
Yield of C_{3+}, #/MCF	9.53	8.37
gal/MCF	1.61	1.36
Yield Basis Brownsville Design Feed Rate, Bbl/Day		
Gasoline	5108	4721
Gas Oil	558	629
Fuel Oil	512	350
Poly Tar	113	98
Total	6291	5797
Chemicals from Water	838	588
Total	7129	6386
Value of Products, $/Day	$36,750	$32,300

The indicated gain of $4,450 per day will justify the installation of a third reactor at Brownsville if operations are comparable to those given here. It should be pointed out, however, that the use of a more active catalyst is a much more attractive method of improving liquid yield since no additional equipment is required.

TABLE II

OPERATION AT LOW INLET VELOCITY

Period	AA	BB	CC	DD
Inlet Velocity, Ft./Sec.	0.65	0.48	0.47	0.69
FLOW RATES, MCFH				
Fresh Feed	10.2	7.1	7.3	10.6
Recycle	11.5	8.4	8.3	12.2
Recycle Ratio	1.13	1.17	1.14	1.14
Bed Depth, Ft.	24.5	24.1	24.1	22.6
Space Velocity, v/hr/v	589	433	438	672
Conversion, % of H_2 + CO Fed	83.8	86.4	86.0	85.1
Selectivity, C_{3+}/C_{1+}, %	79.5	76.2	78.4	81.0
YIELD OF C_{3+}				
#/MCF of H_2 + CO Fed	9.08	9.18	8.62	8.98
gal/MCF of H_2 + CO Fed	1.54	1.56	1.45	1.49
YIELDS BASIS BROWNSVILLE FEED RATE, BBL./DAY				
Gasoline	4837	4772	4493	4638
Gas Oil	393	410	357	548
Fuel Oil	530	514	421	560
Poly Tar	105	103	92	80
Total	5864	5798	5363	5820
Chemicals from Water	979	1044	1030	1073
Total	6843	6842	6393	6894