

INTER-OFFICE MEMO TENNECO CHEMICALS, INC.

TO Dr. R. T. Gottesman AT Piscataway DATE March 19, 1975
FROM Mr. P. J. Patel AT Flemington COPY TO Copy Listing
SUBJECT PLANT STRIPPING TRIALS - FEBRUARY

To take advantage of Pilot Plant manpower availability, as a result of the Flemington Plant shutdown for copolymer conversion, a Burlington Plant experimental stripping program was initiated to establish stripping conditions for dispersion latexes and 315 copolymer slurries. The program also included stripping evaluations of homopolymer products.

Starting February 2 and continuing through March 8 the Polymer Pilot Plant and Engineering groups carried out an around-the-clock five day per week stripping program in the Burlington Plant.

Conclusions

A. 315 Copolymer

The double spike thermal treatment as described in Table I with vinyl acetate monomer (MVAC) add back to 315 slurries has not produced the desired VCM reduction. However, these techniques have produced a 315 dried resin having residual vinyl chloride (MVC) of 10-15 ppm with very little color deterioration. The residual vinyl acetate content of the resin prepared using the MVAC and back technique was abnormally high (0.5%).

At higher agitations the MVC content in 315 slurries appeared to be reduced.

B. (I) Dispersion Latex Stripping - New Agitator Study

The vinyl chloride content in most latexes was substantially reduced by using a new agitator set at 20 rpm in conjunction with nitrogen sparging. The latex filterability as tested by lab leaf filter was not impaired using this procedure. The latex MVC reductions are as follows:

1730 Latexes - In 8-10 hours, MVC levels were reduced to ≤ 850 ppm.
1755 Latexes - In 10 hours, MVC levels were reduced to $\leq 1,340$ ppm.
1757 Latexes - In 10 hours, VCM levels were reduced to $\leq 1,700$ ppm.

(II) MVC Decay - Dispersion Resin Aging

The aging of dried dispersion resins stored in our Burlington warehouse showed a residual MVC content of nondetectable to ≤ 10 ppm for most resins within 7-10 days.

PLANT STRIPPING TRIALS - FEBRUARY

March 19, 1975

C. Homopolymer Stripping Study

200-2

Blend tank sparging, without vacuum, was relatively ineffective in that the rate of VCM reduction was slow. The MVC reduction reached a level of 476 ppm during a 14 hour time span from an initial level of 1,437 ppm.

Future Plant Study

A. 315 Copolymer

Further testing is planned in the latter part of March to evaluate MVAC add back stripping at higher stripper agitation. Due to the poor mixing ability of our current equipment, the MVAC add back stripping technique offers very little advantage.

B. Dispersion Resin - Latex Stripping

The study will investigate the effect of increased agitation (45 rpm) and sparge rate on the MVC removal, latex stability and filterability.

Discussion

A. (I) 315 Copolymer

Two stripping trials were implemented. In the first trial, five sequential batches of 315, prepared in the copolymer plant, were treated as follows:

Individual batches transferred into the stripper were heated to 190°F using live steam and cooled to 165°F by evaporative, vacuum and full jacket cooling. At 165°F, 5% MVAC (1200 lbs.) was added in three 400 lbs. increments at five minute intervals. The MVAC soaking cycle was 30 minutes at 165°F without recovery; then heated to 190°F with vacuum and cooled to 165°F with 300 gallons of cold water injection, evaporative and full jacket cooling.

In the second trial, the same procedure was followed without the addition of MVAC.

The results of these tests are summarized in Table I and Table II. The residual MVC content in the resin was 10-15 ppm, but the MVAC content was abnormally high. The lack of batch to batch reproducibility of residual MVC observed in Table II is thought to be due to poor mass transfer of vinyl chloride from the polymer particles into the aqueous phase which contains the MVAC. The reproducibility may improve if higher agitation and lower MVAC soaking temperature ($\leq 150^{\circ}\text{F}$) is used.

(II) Higher Agitation 315 Stripping (No MVAC Add Back)

In this study 315 slurries were subjected to 190°F using steam and cooled to 165°F using evaporative, vacuum and full jacket cooling. Stripper #3 was used for the improved agitation study. In Table III, MVC contents in the slurries under improved mixing conditions are displayed.

The study of the double spike thermal technique with MVAC add back will be evaluated in stripper #3 during the latter part of March.

B. (I) Dispersion Resin - Latex Stripping

A low shear, high pumping rate agitator was installed on stripper #4 and set at a speed of 20 rpm for the initial trials. Seventeen thirty (1730), 1755 and 1757 latexes were stripped utilizing 15-20 in. Hg. vacuum at 100-110°F, and nitrogen sparge. The completed tower batches were stripped for two hours with the vacuum recovery system and then switched to the steam jet system. Foaming was controlled by the periodic addition of tributyl phosphate defoamer through a spray nozzle. The residual MVC results are summarized in Table IV and in Graphs 1 through 3. It can be seen that a significant reduction in residual VCM content without deteriorating lab leaf test filterability was obtained. The 45 rpm study planned in March should further improve the rate of VCM reduction.

(II) MVC Decay - Dispersion Resin Aging

Pallets of 1750, 1756, 1755, 1757 and 0565 were sampled daily for the analysis of residual MVC. It was found that for most resins MVC content decays to N.D - 10 ppm level within 7-10 days.

(III) 200-2

Blend tank sparging MVC data is shown in Table V.

Miscellaneous

In addition to the previously discussed projects, the Pilot Plant has assisted Process Engineering on the following projects:

- (i) Monitoring of 315 special batches,
- (ii) Monitoring of 903 blending system for dispersion foam resin, and
- (iii) Analysis of slurries and latexes for MVC contents.

P. J. Patel
P. J. Patel

PJP/amp
Attachments

TABLE I
COPOLYMER STRIPPING
315 TEST DATA
DOUBLE SPIKE EXPERIMENTS

<u>Sample Source</u>	<u>Residual MVAC</u>	<u>Average MVC ppm</u>	<u>MVC Range ppm</u>	<u>Resin Color</u>		
				<u>L</u>	<u>a</u>	<u>b</u>
Control Drier	--	78.3	69-84	89.4	-1.1	3.2
'G' MVAC Add back Double Spike Drier	5034	13.8	4.5-27	88.6	-0.7	4.5
'H' No MVAC Add back Double Spike Drier	1196	10.8	7.7-16.1	89.1	-0.7	4.5

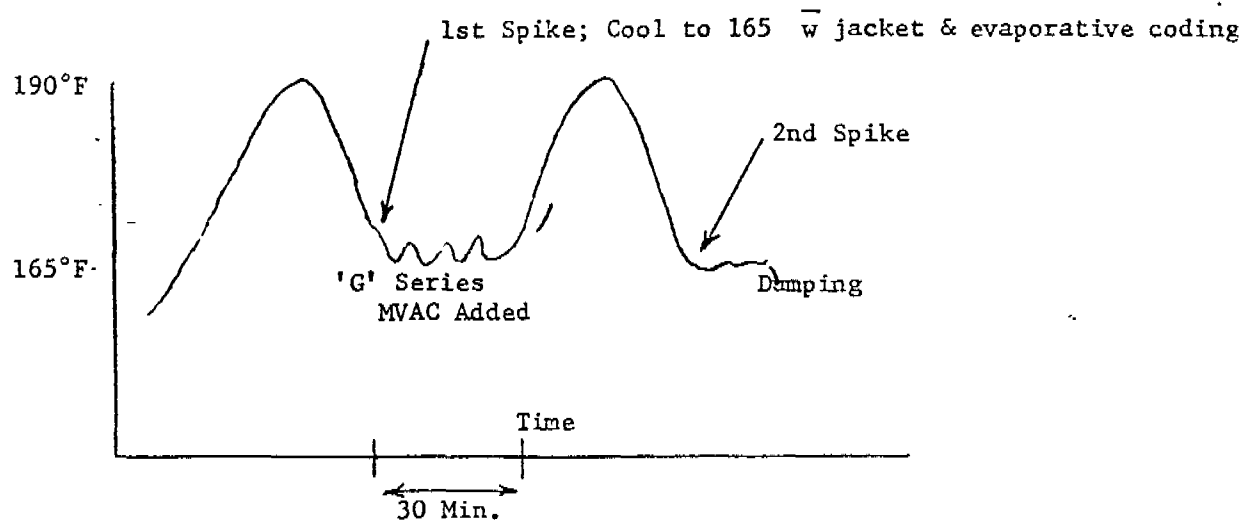


TABLE II
RESIDUAL MVC EVALUATION 315 SLURRIES
DOUBLE SPIKE EXPERIMENTS

'G' Series 5% MVAC Add Back			'H' Series No MVAC		
Sample	Residual		Sample	Residual	
	MVC (ppm)	MVAC (ppm)		MVC (ppm)	MVAC (ppm)
G-1	290	4,289	H-1	473	7,029
G-2	43	5,565	H-2	104	2,079
G-3	1,290	9,006	H-3	331	2,832
G-4	141	10,437	H-4	20	1,237
G-5	231	4,912	H-5	150	3,736
G-6	88	7,048	H-6	89	1,897
G-7	697	15,007	H-7	362	3,614
G-8	69	9,728	H-8	95	1,939
G-9	990	7,295	H-9	725	3,864
G-10	14	7,679	H-10	35	2,030
Blend Tank	290	8,241	Blend Tank	58	2,198

NOTE: "315 Slurries"

	MVC Average (ppm)	
	'G'	'H'
1st Spike	700	408
2nd Spike	71	69

TABLE III
IMPROVED AGITATION VS. MVC (ppm)
315 SLURRIES
PRELIMINARY DATA

<u>Normal Agitation</u> <u>Stripper #2</u> After First Spike ("H" Trial) <u>MVC (ppm)</u>		<u>Improved Agitation</u> <u>Stripper #3</u> <u>MVC (ppm)</u>	
<u>Average</u>	<u>Range</u>	<u>Average</u>	<u>Range</u>
408(1)	150 - 725	234(2)	167 - 302.4

(1) Average of 5 batches.

(2) Average of 4 batches.

TABLE IV
NEW AGITATOR STRIPPING STUDY
DISPERSION LATEXES

	Residual MVC (ppm)				% Moisture	Comments
	2 Hours	6 Hours	8 Hours	10 Hours	Cake	
<u>1730 Latexes</u>						
92	6,493	--	--	5,630	25.3	No Sparge
94	6,086	--	256	--	28.8	Sparge 7.3 CFM
93	6,350	--	850	--	22.3	Sparge 7.3 CFM
96	3,569	1,955	--	--	26.7	Sparge .25 CFM
97	4,637	1,392	--	--	25.8	Sparge .25 CFM
98	9,853	3,217	--	--	23.3	Sparge .25 CFM
99	5,476	2,227	--	--	22.9	Sparge .25 CFM
<u>1755 Latexes</u>						
86	10,814	958	--	--	22.6	Sparge 25 CFM
85	4,140	--	--	1,340	23.1	No Sparge
<u>1757 Latexes</u>						
89	13,428	--	--	9,186	23.5	No Sparge
90	10,442	--	--	1,642	22.1	Sparge 1.5 CFM
91	9,792	--	--	1,590	25.0	Sparge 7.3 CFM

TABLE V
HOMOPOLYMER STRIPPING EXPERIMENT
200-2
BLEND TANK SPARGING

<u>Sample</u>	<u>Hours</u>	<u>MVC (ppm)</u> <u>Slurry</u>
95-1	0	1,437
95-2	2	1,131
95-3	4	1,015
95-4	6	787
95-5	10	626
95-6	14	476

Dry Product = 280 ppm

Stripped 200-2 with proper D.B.T. 900 ppm

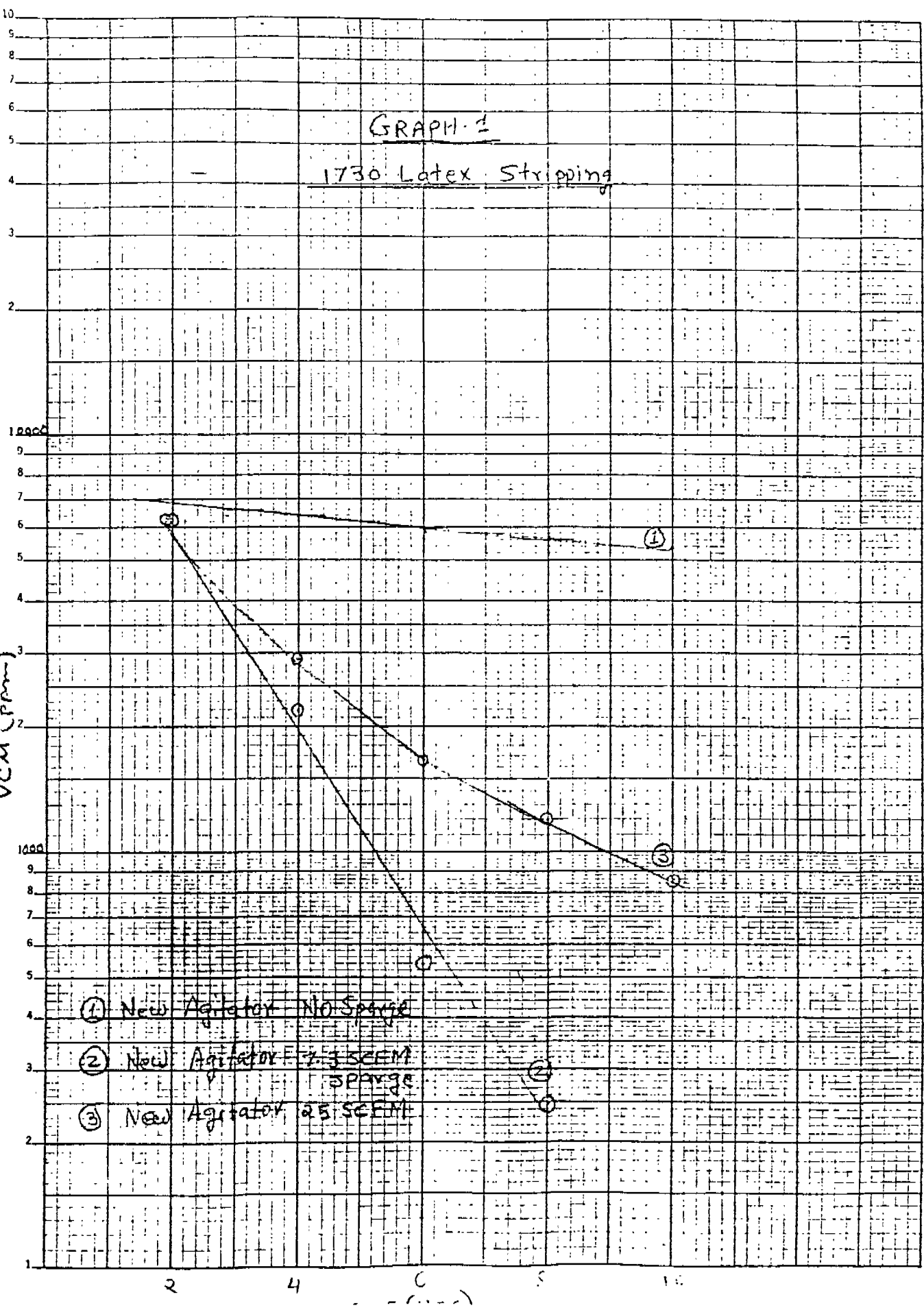
Note: Blend Tank #5. Nitrogen Sparge Rate 50 SCFM.

KOE SEMI-LOGARITHMIC 350-71
 KEUFFEL & ESSER CO. MADE IN U.S.A.
 3 CYCLES X 70 DIVISIONS

VCM (ppm)

GRAPH-1

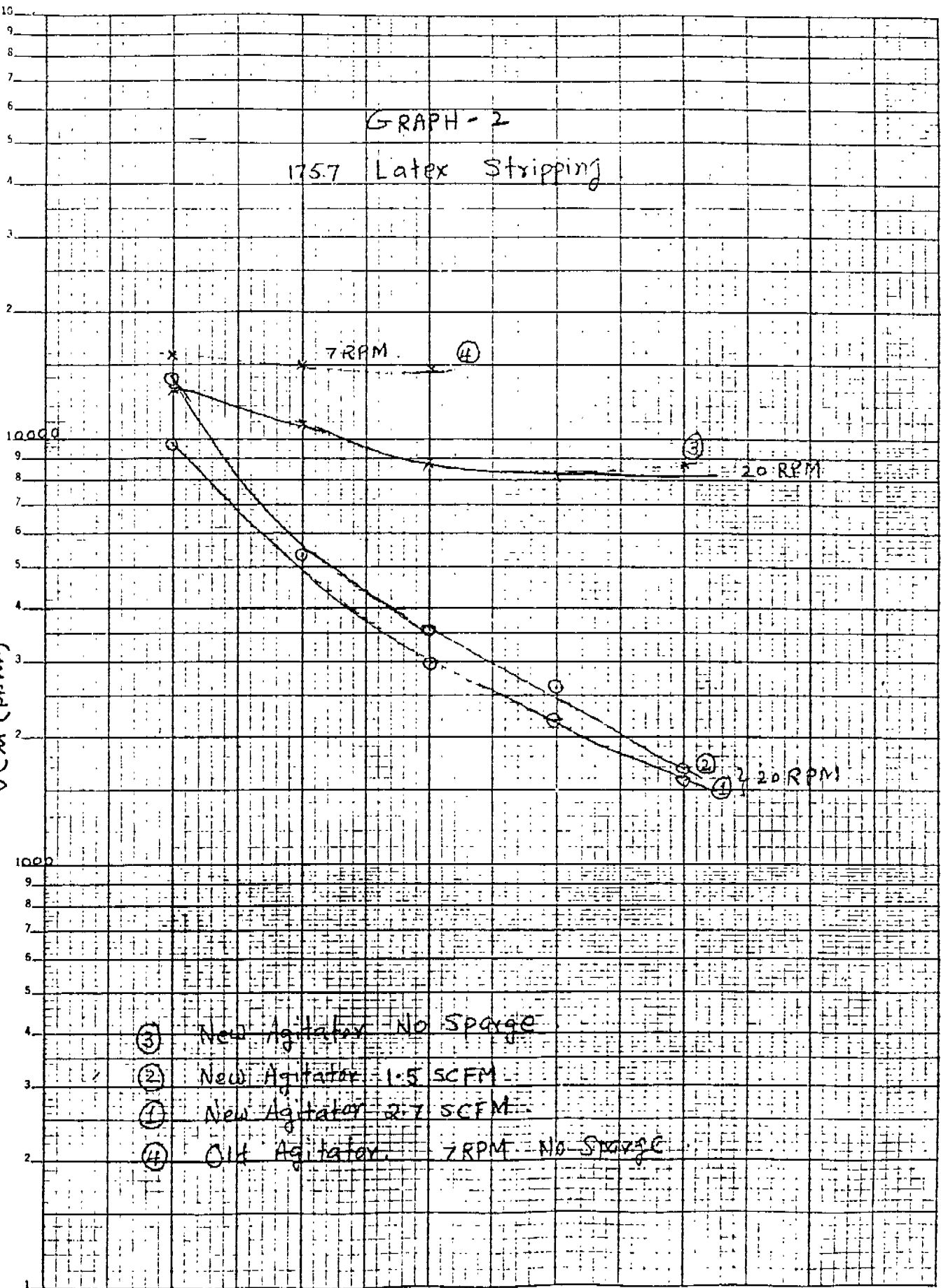
1730 Latex Stripping



- (1) New Agitator No Sparge
- (2) New Agitator 2.3 SCFM Sparge
- (3) New Agitator 2.5 SCFM Sparge

K&E SEMI-LOGARITHMIC 359-71
 KEUFFEL & ESSER CO. MADE IN U.S.A.
 3 CYCLES X 70 DIVISIONS

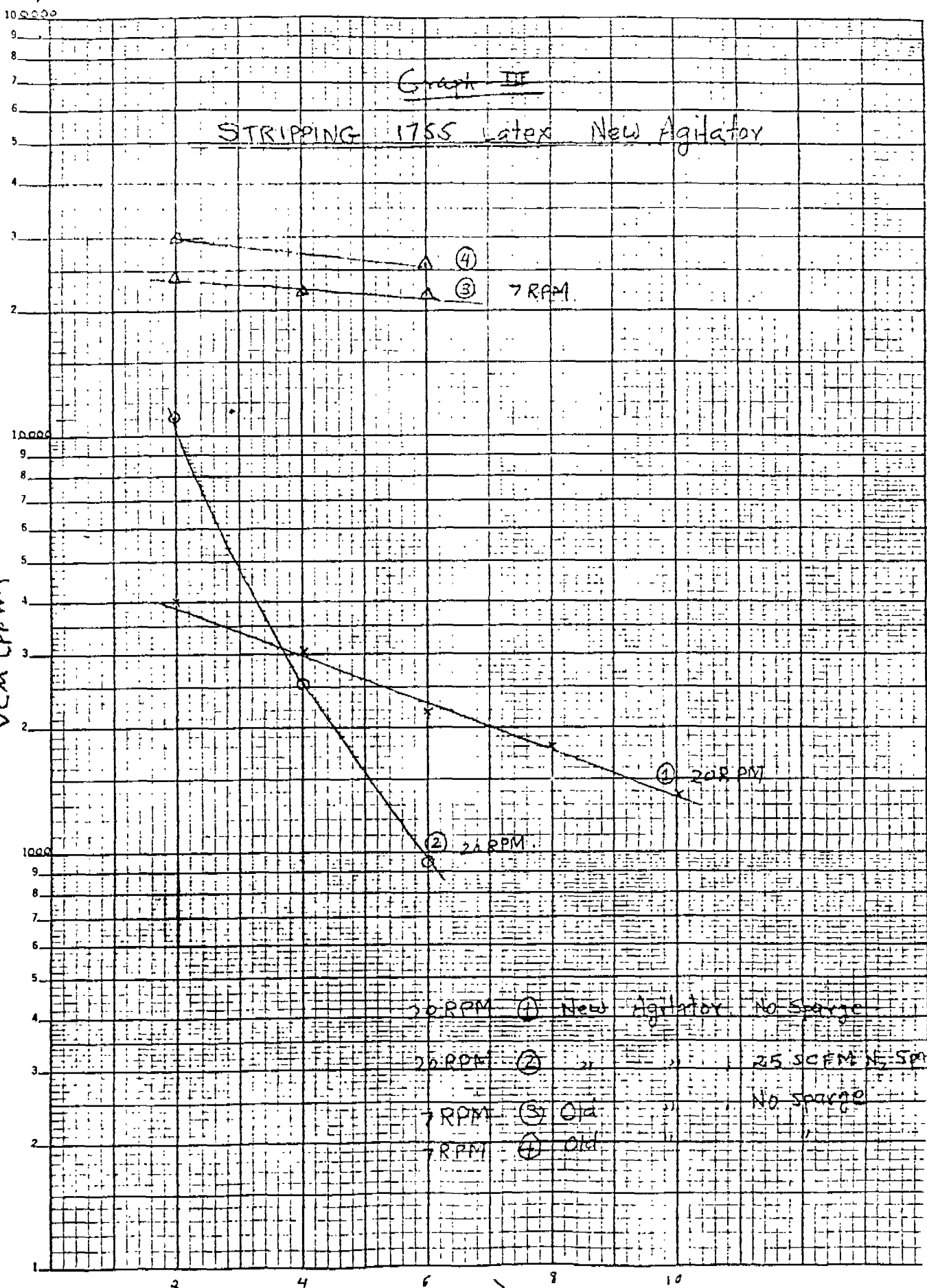
VCM (ppm)



- (3) New Agitator - No Sparge
- (2) New Agitator - 1.5 SCFM
- (1) New Agitator - 2.7 SCFM
- (4) Old Agitator - 7 RPM - No Sparge

KE SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

VCN (PPM)



20 RPM ① New Agitator No Sparge
20 RPM ② " " 25 SCFM N₂ Sp
7 RPM ⑤ Old " No Sparge
7 RPM ⑥ Old " "