INTER-OFFICE MEMO **TENNECO CHEMICALS, INC.**

To Distribution At Date October 14, 1976

From P. Scheiner At Burlington Copy to

Subject BURLINGTON DISPERSION TOWER RECOVERY - DEI-508

RECOMMENDATION

The EPA requires that the monomer level in a Reactor be reduced to 0.002 lbs/1001bs of product prior to the opening of a Reactor for cleaning. The resulting VCM levels of 2670 ppm and 2540 ppm in A and B Dispersion Towers respectively should be reached by direct upflow steaming of the Towers. The impact on productivity will be minor since the required cycle extension of 15 minutes can be combined with a similar reduction in the Tower Air-Out cycle. A modest capital expenditure will be necessary to provide steam to each tower and provide a tie-in to the recovery system.

CONCLUSIONS

A variety of Tower Recovery methods have proven adequate for achieving appropriate levels. These methods include steaming upflow through the tower, steaming downflow through the tower and a subsequent knock-out pot, and the use of an inert gas in conjunction with a hot jacket technique.

The recommended procedure calls for the use of upflow steaming in conjunction with a hot jacket (150 F). A 3/4" steam line will be needed to assure 650 #HR of steam. A tie-in to the Fume Scrubber will also be necessary. The recovery conditions for the tower are 20" Hg vacuum and a jacket temperature set to its maximum, 150 F. Steaming for 15 minutes will result in VCM levels below 2500 ppm and permit opening of the tower for cleaning. The normal one-hour cycle for airing out of the tower prior to cleaning can be reduced to ½ hour with adequate results. Hence the tower cycle will be slightly reduced. The Recovery System will, however, be required for an additional 15 minutes after normal Tower/Stripper recovery. The recovery system should be available for this time regardless of whether the next batch is dumped since the next batch is allowed to sit in the Stripper at least 15 minutes prior to Recovery.

An alternate method would be downflow steaming of the Tower. The condensate forming via this method would need to be separated via a knock-out system to allow for recovery of the vapors without trapping liquid in the vapor line. This method is not recommended in that it would be inherently more difficult to operate as well as being more costly.

The use of inert gas in conjunction with hot jacket techniques would also achieve the desired results. This can be accomplished by either direct continuous nitrogen purging or by stagewise nitrogen addition. Stagewise nitrogen addition would extend the cycle by more than one hour while both nitrogen methods would place excessive loads on the Proposed Activated Carbon Plant.

DISCUSSION

The test methods utilized for upflow steaming is summarized in Appendix 1. Figure 1 is a sketch depicting the piping configuration for these tests. An ejector was utilized for the test runs since no line was available from the top of the Towers to the Recovery System.

Table I summarizes Tower Recovery Data. The data indicates that no advantage can be gained by increasing the steam rate beyond 650 lbs/hr. A steam rate of 1300 lbs/hr is no better than a rate of 650 lbs/hr. The effect of downflow vs upflow steaming was not expected to produce any significant difference. This was confirmed by the test run of 9/22/76 where a Stripper was utilized as a knock-out pot for the run. A test was performed on 10/5/76 which confirmed the necessity of a knock-out pot for downflow steaming since the elevation of the Fume Scrubber is above the Dump Line. The use of hot jacket techniques without steaming was found to be unsuccessful within a one hour cycle extension.

The data collected at a steam flow of 650 lbs/hr and 20 in. Hg VAC. at 150 F jacket temperature are graphically presented in Figure 2. The graph indicates that 15 minutes of steaming is sufficient to produce desired results. The curve actually crosses the 2500 ppm residual monomer level in less than 10 minutes. A test performed with a hot jacket and no steam or cycle extension indicates that the curve rises asymptotically between zero and 10 minutes. The effective results in such a short steaming time is possible because of the diffusion of monomer from the wall build-up during the normal 1-2 hour Stripper/Tower Recovery time. A small flow of steam then serves to displace the monomer that has emanated from the build-up as well as the monomer remaining in the Tower after the batch has been dumped and recovered.

Additional tests were performed to evaluate hot jacket techniques alone and in conjunction with nitrogen evacuations. A sample point for these runs was located in the dump line. The dump line contained sufficient build-up to invalidate the VCM readings. The data from these runs have therefore been excluded from this report. However, from these tests the stagewise addition of nitrogen with subsequent evacuations can be expected to reach EPA requirements. The difficulties inherent in this method includes the cost of further processing of nitrogen as well as a resulting tower cycle extension of about one hour. Continuous nitrogen purging would reduce the cycle extension somewhat but result in further impact on the Activated Carbon Plant.

SUMMARY

Compliance with EPA regulations should be met by the use of upflow steaming of the Towers. This method requires the installation of a 3/4" steam supply to the bottom of each of the towers. The top of each Tower should be tied into 3" headers leading to the Fume Scrubbers. The condensate deposited in the bottom of the tower will need to be drained prior to the Airing-Out of the Tower. Provisions should be made to tie this condensate drain into the proposed Water Stripping System.

P. Scheiner

PS/ib

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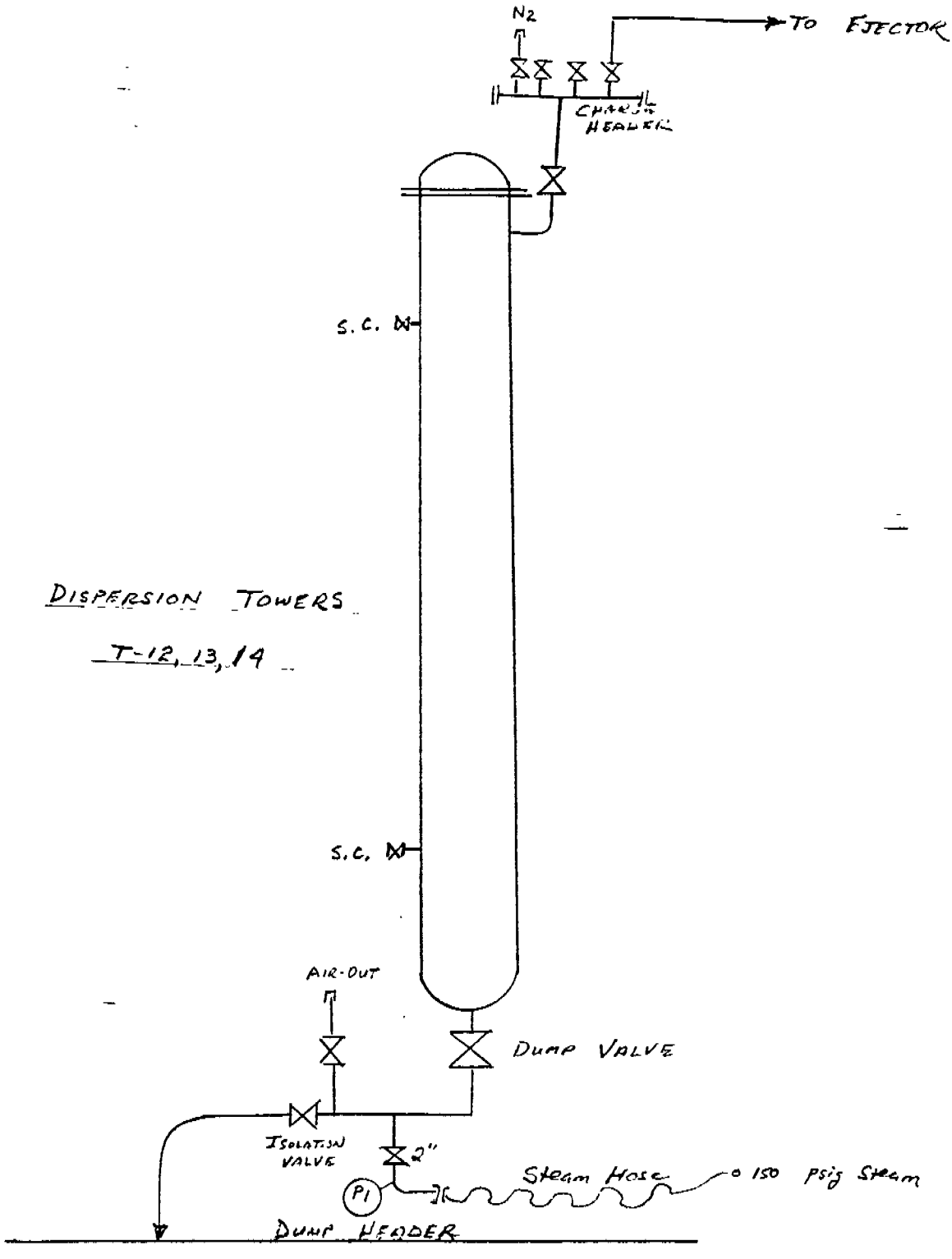
TABLE 1.

PLASTISOL TOWER RECOVERIES

DESCRIPTION	CYCLE EXTENSION	DATE	PRODUCT	TOWER	RESULT (ppm)
Hot Jacket	None	9/14/76	0565	T-13	290,000
Hot Jacket	1 Hr.	8/31/76	1755	T-14	6,015
Hot Jacket	1 Hr.	9/16/76	0565	T-12	58,000
Upflow steam (650 #/HR)	45 Min.	9/8/76	1730	T-14	500
	30 Min.	9/10/76	1730	T-12	480
	20 Min.	9/10/76	1730	T-13	1270
	15 Min.	9/13/76	0565	T-13	1050
	10 Min.	9/15/76	0565	T-13	2030
Downflow Steam(650#/HR) W/Knock-out Pot	30 Min.	9/22/76	1755	T-14	750
Downflow Steam(650#/HR) W/OKnock-out Pot	30 Min.	10/5/76	0565	T-14	8000
Upflow steam (1300 #/HR)	1 Hr.	8/26/76	1755	T-13	1275
	1 Hr.	8/27/76	1755	T-13	610
	40 Min.	8/31/76	1755	T-12	490
	30 Min.	8/30/76	1755	T-14	1050

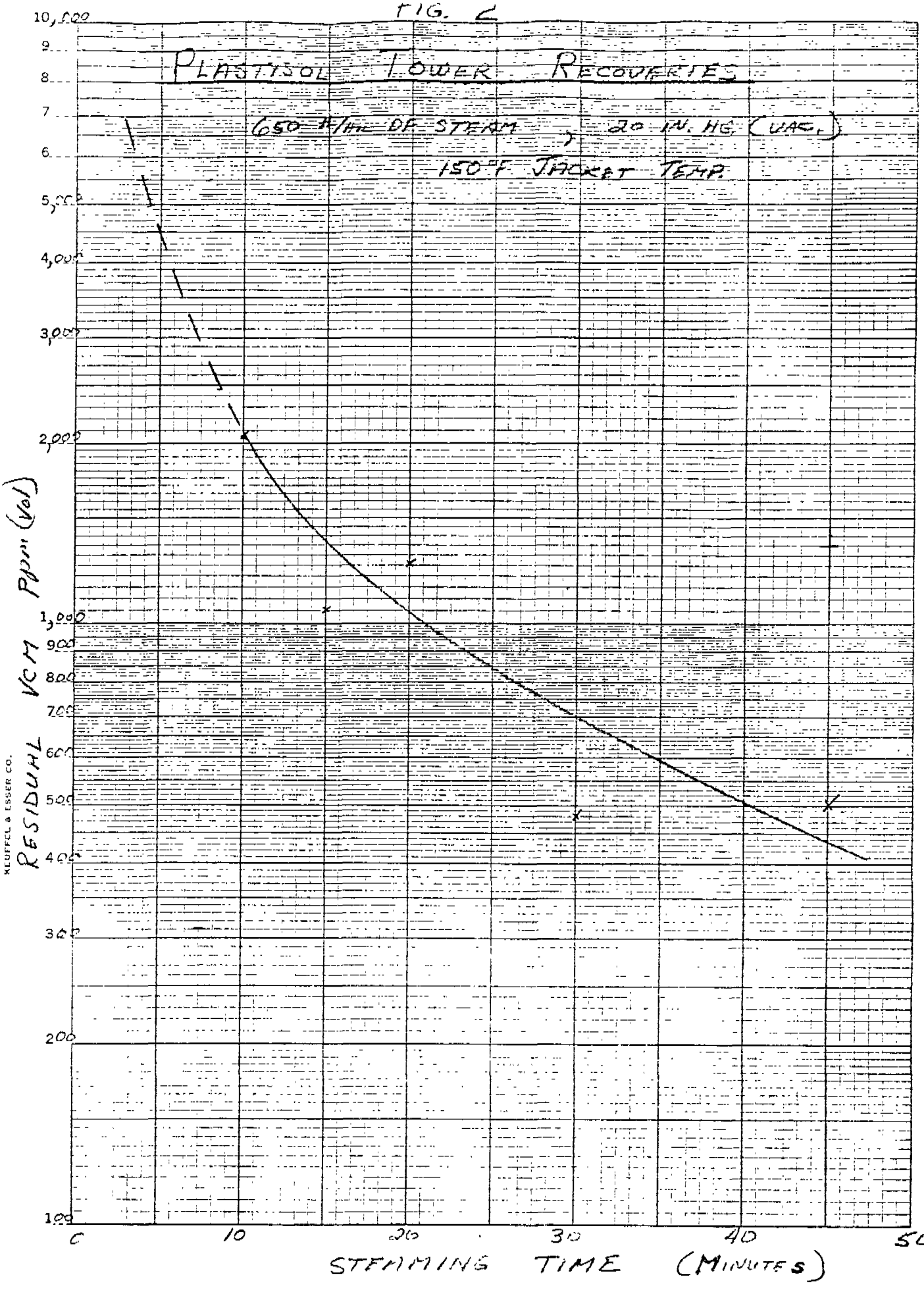
FIGURE 1. UP-FLOW STEAMING PROCEDURE



DISPERSION TOWERS

T-12, 13, 14

FIG. 2



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APPENDIX 1. PLASTISOL TOWER RECOVERY "UPFLOW" PROCEDURE

1. Dump batch to stripper in normal manner.

2. Set temperature control in the Tower to 160°F after Tower is emptied.

3. Recover Tower and Stripper down to 22" Hg (VAC) by recovering through the Stripper in the normal manner.

4. Close the isolation valve in the dump line.

5. Open Tower to ejector.

6. Steam through bottom of Tower for specified period of time.

7. After steaming, close steam line and evacuation line.

8. Break vacuum with nitrogen and take samples.