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

TO W. Miringoff AT Burlington DATE January 29, 1975

FROM F. D. Richardson AT Burlington COPY TO H. B. Carr
W.C. Champion
R.S. Cole
Dr. L. Gross
J.W. McBroom
J.W. Poarch
P.R. Scarito
A.C. Siegel
J.T. Sweeney
J.J. Zullo
P.E. - Burlington
Pilot Plant - Flemington
File

SUBJECT PROCESS ENGINEERING REPORT
January, 1975

HOMOPOLYMER STRIPPER REFLUX CONDENSER

At a meeting with Manufacturing personnel in late December a proposal was made to install a condenser on a homopolymer stripper according to Scheme B of the attached sketch. This design would cool a stripper batch, by evaporative cooling only, from 220°F to 165°F in about 18 minutes. At the meeting the objection was raised that the external loop seal might rapidly plug with entrained resin. Furthermore, it was pointed out that, with the lower cooling requirements currently envisioned, the simple " knock-back " configuration might be satisfactory.

It was therefore agreed that Process and Project Engineering would investigate the simple " knock-back " design (Scheme A) and a design wherein the condenser was installed after the Foam Knock-Out Tank (Scheme E). The requirement was that the batch be cooled from 210°F to 190°F in the same period of time as required during the December stripping tests. (Cooling from 190°F to 165°F would be accomplished by cold water injection). Consideration would be given to the amount of cooling accomplished by the stripper jacket.

Study of December and January stripping data indicates that combined jacket-cooling and evaporative cooling (to the extent possible without a condenser) will reduce the temperature from 210° to 190°F in 20 minutes. About one-half of this cooling is accomplished by the jacket.

We have found that the simple knock-back design with one feed line is not suitable because the line, which handles both vapor feed and condensate return, is the limiting factor and it would flood at a very low rate. Also the cooling water rate on the shell side of the condenser would have to be so low that unstable heat transfer conditions would result. As an alternative we have studied a knock-back condenser arrangement with two feeds, shown as Scheme D. In this case all of the condensate and some of the vapor feed would pass through the feed line entering the bottom of the condenser; the balance of the vapor would follow the side-entering feed line. As the total vapor flow changes, the distribution of vapor between the two lines would self-adjust to maintain the bottom line at a mildly flooded condition. This would allow the total vapor rate to go to the flooding limit of the condenser tubes- - - about 2000 pounds per hour.

For the installation shown as Scheme E, the condenser can be installed in downflow position since resin carry-over is not a serious threat after the Foam Knock-Out Tank. In this case flooding is not a concern but there is a limit in that the pressure drop in the long line from the stripper to the Foam Knock-Out Tank is so great that the condensing temperature is lowered and the temperature difference for heat transfer is reduced. There is also the question of whether the high vapor rates to the Foam Knock-Out Tank would carry significant amounts or resin; since this a carbon steel system I presume such resin would have to be discarded.

To summarize, the cooling times required for going from 210°F to 190°F , and including jacket cooling, are:

Jacket Cooling Only	40 min.
Knock-back Condenser with One Feed	25 min.
Knock-back Condenser with Two Feeds	10 min.
Downflow after Foam Knock-Out Tank	8 min.
Downflow at Stripper (Scheme C)	5 min.

So for present cooling requirements there is no great difference between Schemes C, D and E. If more extensive evaporative cooling were desired, perhaps to conserve demineralized water or to reduce load on the centrifuge, then Scheme C is considerably faster than the others.

Project Engineering is developing piping drawing and cost estimate for these alternates and we expect to meet with Manufacturing personnel again in the near future.

Attempts to locate a similar heat exchanger for the other stripper on the used equipment market have not been successful. Delivery times for new condensers have dropped from 44 weeks to 24 weeks with tubing availability the limiting factor. More information is expected during the first week in February.

STACK DESIGN

Exchanged information with Tenneco's Houston computer group on available programs for predicting concentrations of effluents (VCM) down wind of stacks. We will want to use such a program to predict concentrations both on the site and in surrounding areas. It is not certain as yet whether either program we have received will handle both problems. The information which will be developed would be used to determine stack height and location and location of fresh air intake points.

CANNED PUMPS FOR VCM SERVICE

A list of all pumps handling monomer at Burlington was prepared. The service requirements for each are being assembled from the files. If none of these pumps is in more severe service than that of the canned pump which has been ordered for testing at Flemington, then there appears to be no need for a second test at Burlington.

REACTOR BAFFLE ORIENTATION

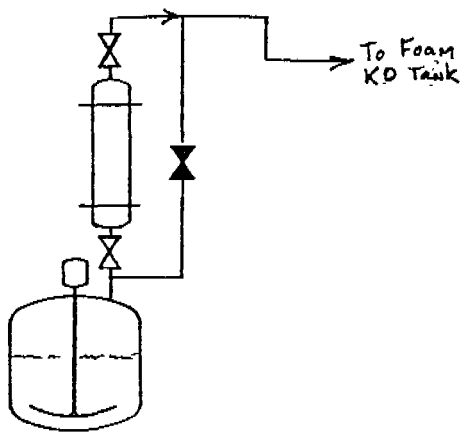
We were asked to check the baffle orientation in the homopolymer and copolymer reactors. It was considered that any differences found might be correlated with product variations and that the baffle orientation could then be deliberately changed to obtain desired characteristics. So far we have been able to check all of the homopolymer reactors except one (10, 11, 12, 13, 14, 15, 16). There were no observable differences. On the copolymer side we have checked only, 1, 2, 6 and 9. Reactors 1 and 6 seem to be the same as those on the homopolymer side. Reactors 2 and 9 have baffles that are rotated slightly so that the baffle tips are perhaps moved about 3 inches with respect to the vessel centerline. This doesn't appear to be a significant difference; the tendency would be to increase turbulence near the center of the Reactor and decrease it near the wall. It is interesting that operating personnel claim that reactor Number 2 requires more frequent cleaning because of rapid build-up on the walls; this started, they believe, after the baffle was changed. Reactors 2 and 9 were cited as harder to clean than others but this could be due to many reasons. The remainder of the Reactors will be checked as they are available.

F. D. Richardson

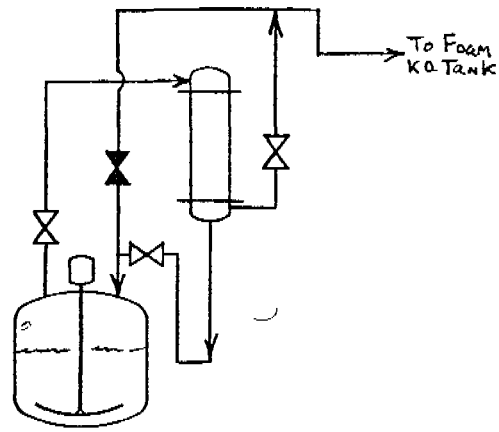
FDR/km

BY fdv DATE 1/27/75 SUBJECT Various Arrangements for Installation of Homopolymer Stripper Reflux Condenser SHEET NO. 1 OF 1

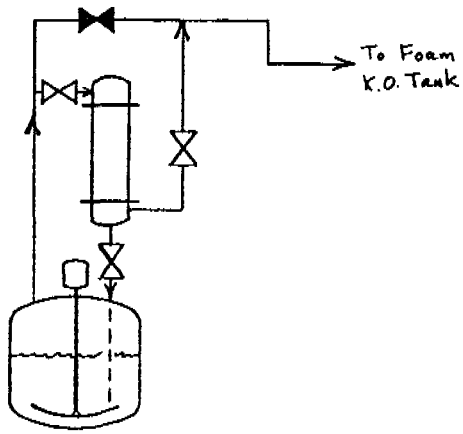
CHKD. BY ____ DATE ____ JOB NO. ____



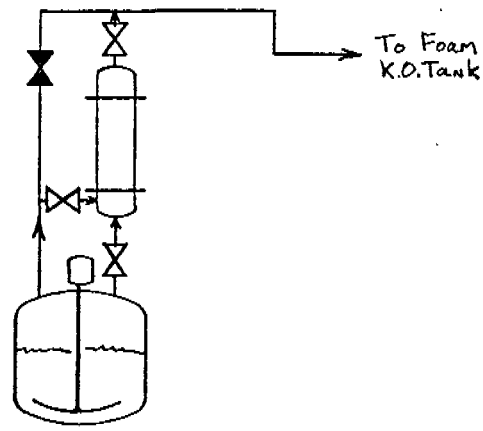
Scheme A: Straight Knock-Back Design



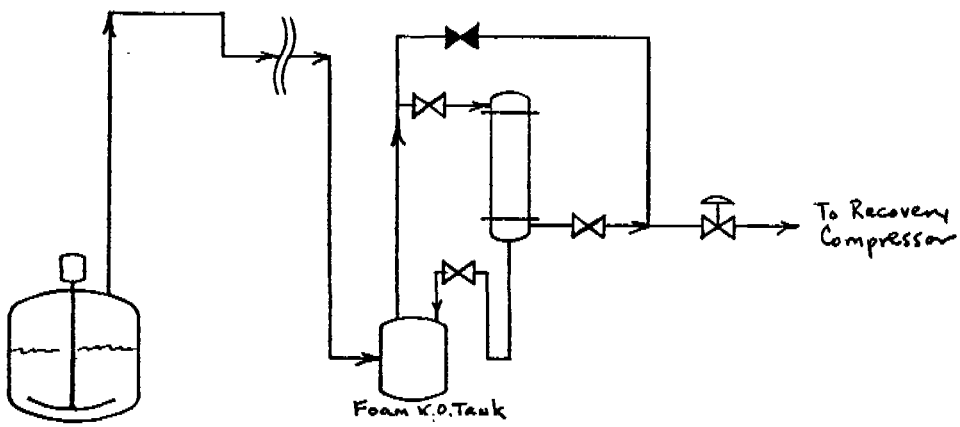
Scheme B: Downflow w/External Loop Seal



Scheme C: Downflow w/Internal Dipleg Seal



Scheme D: Knock-Back w/Two Feed Lines



Scheme E: Downflow After Foam Knock-Out Tank

C. F. D. Ri rdson FROM January 1 TO January 31, 1975

TENNECO INTERMEDIATES DIVISION ENGINEERING TIME DISTRIBUTION - MONTHLY (SALARY)

PROJECT NUMBER	ACCOUNT NUMBER	JOB DESCRIPTION	SUN	MON	TUE	WED	THU	FRI	SAT	TOTAL
DE1-377		Homopolymer Stripper Reflux Condenser								80
DE1-377		Stack Design Study								38
DE1-377		Canned Pumps for VCM Service								18
DE1-377		Reactor Water Fill for VCM Displacement								8
		Check orientation of Baffles in Suspension Plant Reactors								8
		Miscellaneous Meetings								8
		Holiday								8
		off due to Death in Family								16
ENG. FORM #29		TOTALS								184

COLORITE 010957

L. A. Schappell

FROM January 6, 1975 TO January 31, 1975

TENNECO INTERMEDIATES DIVISION ENGINEERING TIME DISTRIBUTION - MONTHLY (SALARY)

PROJECT NUMBER	ACCOUNT NUMBER	JOB DESCRIPTION	SUN	MON	TUE	WED	THU	FRI	SAT	TOTAL
DEI-377		VCM Analysis - Vent Condenser		1	1	1	4	1		8
		OC Coating, LOP 1035		2	1	1		1		5
		Foam Resins, 1750 and 1756				8	8	8		24
DEI-377		VCM Decay in Dispersion Resins		1	1	1	1	2		6
DEI-377		250 Stripping Trials		1	3		2			6
		315, LOP 1045		2				2		4
		BR-505					1	1		2
DEI-377		315 Stripping Trials		1	2					3
		Orientation		24	24	18	16	17		99
		Annual Physical Exam.				3				3
ENG. FORM #29		TOTALS		32	32	32	32	32		160

COLORITE 010958

NAME M. Wil[illegible]feld FROM January 1, 1975 TO January 31, 19[illegible]

TENNECO INTERMEDIATES DIVISION ENGINEERING TIME DISTRIBUTION - MONTHLY (SALARY)

PROJECT NUMBER	ACCOUNT NUMBER	JOB DESCRIPTION	SUN	MON	TUE	WED	THU	FRI	SAT	TOTAL
		Flemington Conversion								160
		Sick								16
		Holiday								8
		TOTALS								184

ENG. FORM #29

COLORITE 010959

NAME W. Mirinoff FROM January 1, 1975 TO January 31, 1975

TENNECO INTERMEDIATES DIVISION ENGINEERING TIME DISTRIBUTION - MONTHLY (SALARY)

PROJECT NUMBER	ACCOUNT NUMBER	JOB DESCRIPTION	SUN	MON	TUE	WED	THU	FRI	SAT	TOTAL
DEI-377										120
DEI-406		Waste Treatment								12
		Foam Resins NPI 1042,1043								20
		BR- 505 NPI 1041								12
		Quality Problems								12
Holiday		Holiday								8
ENG. FORM #29		TOTALS								184

COLORITE 010960