APPENDIX B
UCC TRIP REPORT

UC 149-2

UNION CARBIDE INTERNAL CORRESPONDENCE

CHEMICALS AND PLASTICS

P. O. BOX 471, TEXAS CITY, TEXAS 77590

TO (NAME) Dr. J. C. Chaty
COMPANY Mr. M. E. Eisenhour
LOCATION Mr. R. L. Frantz
Dr. A. B. Steele, NY (28)

DATE September 15, 1975

COPY TO Mr. F. L. Johnson
Mr. R. P. Keefe
Dr. W. R. Manning, 511
Mr. R. H. May
Dr. D. R. Montgomery
Mr. G. F. Tacquard

SUBJECT B. F. Goodrich Stripping Technolc for Suspension Resins - Trip Repc

RECEIVED
SEP 1 1975

Gentlemen:

On September 9, 1975, Dr. W. R. Manning and I visited B. F. Goodrich's Avon Lake Plant near Cleveland, Ohio to discuss the stripping column technique in use for suspension vinyl resins. Mr. A. L. Hastings of B. F. Goodrich's International Licensing Department (Cleveland) was our host and provided all of the information. A visit to an operating column and a new column to be erected in the plant was also made.

The following information was obtained along with the attached diagram of the system.

1. License fee - A flat $150M for U. S. practice which includes the detail design of a 20 M lb/hr (dry resin basis) unit plus one additional design at our discretion. No guarantees are included, and troubleshooting and start-up of equipment could be done with their consultation on a per diem basis. No "know-how" exchange would be involved on a regular basis, but they would extend the agreement to include complete operational information on the start-up and operation of their new column at Avon Lake. The time for a process design for our application would be less than sixty days.

2. They will run three unstripped, 50-gallon samples of resin slurry through their six-inch, eight-tray pilot plant column to predict operating conditions and results for a production sized column. This would be done free of charge. I recommend that 50-gallon samples of VSJE, QSQF and QSAN be used. Samples should be shipped to: B. F. Goodrich Research Center, 9200 Brecksville Road, Brecksville, Ohio to the attention of George Huddleston.

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3. They are currently operating a 6M lb/hr column on bottle resin. This column is a 30-inch O.D. column with seventeen trays, approximately forty-feet tall. It has been operational for one and one-half years and consistently gives less than 10 ppm residual VCM in the resin coming from the bottom of the column. Dried resin was less than 1 ppm. While we were there, the daily sample indicated 6 ppm in the column slurry. Table I indicates the operating conditions. They had considered getting out of the bottle resin business, but after the successful operation of this column in reducing residual VCM, decided to continue producing the bottle resin (similar to our QSQF, but without C_2H_4). The steam is introduced above the liquid level just below the first tray. There are seventeen sieved trays ~~with downcomers~~. NOTE The trays apparently have 0.5-inch holes with 1.75-inch spacings and 120 holes/tray. (This was apparently not to be revealed to us at this time but was easily discernible through Mr. Hastings blotting out on the flowsheet.) Downcomer design was not revealed.

4. The new columns (seven have been ordered for several locations) are fifty-four inches in diameter and about seventy feet tall. The columns have twenty trays. The cost (current and near future) of the new columns (including piping, condenser, condensate receiver, condensate reflux pump, bottoms pump, necessary motor valves, field instrumentation, insulation, and electrical wiring and conduit) is $249M. It is constructed within a steel frame and shipped by rail car. The column had a label citing Roark Manufacturing Company as the builder. The maximum allowable working pressure was 40 psig. The new system will use feed from a holding tank where the slurry has been vented to 20-30 psig (or about 5-7% monomer per BFG). No prestripping other than this preliminary venting will be necessary. The column is all stainless steel with no special coatings to prevent sticking. Although the columns will handle 20M lb/hr, some of them will only be run at 10M lb/hr with no modifications. A 10 x 12 foot area is needed for the skid-mounted package. No cooling is required on the slurry going to the slurry blend tank. ?

5. General information about operation included the following: no additional operator is required, ethylene and propylene copolymers present no problems, minimum turn down ratio on steam is 50%, but could go to 35% on feed, no visual color differences between feed and stripped slurry (although minor differences could be determined on a pressed tablet by instrument), no special additives for heat stability are used, and a means of varying residence time is available, but apparently only by "changing the internals".

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6. The basic process is to raise the resin temperature high enough in a short period of time to improve the diffusion coefficient of the VCM in PVC. Operating the stripping column at a positive pressure instead of a vacuum permits a higher temperature and thus a faster diffusion process which permits less exposure to the high temperature and prevents degradation. However, in their pilot plant, a slight vacuum was required with VAc co-polymer because a temperature of only 180°F (82°C) could be used without "agglomeration", whereas 235°F (113°C) was permitted with homopolymer. Copolymer was stripped to 420 ppm on a single pass in the pilot plant eight-tray column. Stripping time is normally less than three minutes.

Mr. Hastings also informed us of B. F. Goodrich's application for patents on a reactor additive which eliminated wall fouling for PVC homopolymer. A solution is sprayed on the reactor walls (either stainless steel or glass) between each batch (using the rinse valves). This is followed by a water rinsing (to prevent resin contamination with this additive on the succeeding batch). The additive forms a one-molecule thick coating on the walls. High pressure washing is then done only every 100 - 200 batches, and then only for product changes or on very critical applications. Hastings promised to send a secrecy agreement for this technology to Union Carbide along with a draft of the license for the stripping technology.

Yours very truly,

A. A. Peterson

AAP/st
Attachments

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TABLE I

Column size, diameter, inches	30	54
Rated capacity, M lb/hr dr resin	6	20
Feed temperature, °F (°C)	130-155(54-68)	130-155(54-68)
Head temperature, °F (°C)	230(110)	unknown
	215*(101)	unknown
Head pressure, psig	8	unknown
	0*	unknown
Bottom temperature	235(113)	unknown
	217*(103)	unknown
Feed rate, gpm	40	unknown
Steam rate @ 20 psig lb/hr	1500	unknown
Steam temperature, °F (°C)	280(138)	unknown
Desuperheated steam temp.°F (°C)	240(116)	unknown
Desuperheat water rate, gph	15	unknown
Solids content, feed, %	~30	~30
Steam usage, lb/lb dry resin	0.3	0.2

A. A. Peterson
September 15, 1975

STRIPPING COLUMN SCHEMATIC
R/CM ELIMINATION - RECOVERY
ALGCP 12/15/74 EM