

VCM COMPLIANCE STATUS  
SUSPENSION/NON-SOLVENT VINYL DEPARTMENT  
MARCH 8, 1976

Significant reductions in VCM emissions and exposures have been made in the Suspension/Non-Solvent Vinyl Resin Unit since the VCM health problem was first identified early in 1974. A way is seen to comply with the extremely strict government regulations as well as or better than the rest of the suspension PVC industry. The job has been tough and rather costly as will be shown. The effort will continue and be never ending as ways to further reduce mask time are sought and implemented.

Let's look at several slides which will detail the effort and the results.

Average VCM exposure (8-hr TWA) by carbon tube. About 40 analyses/month. Both operations and maintenance analyses is done by Industrial Hygiene group. Describe method. Early data quite variable, because of few samples and developing method. January and February are plotted. Range from 0.0 to <sup>over</sup>25 ppm so far this year. Exposures are without regard to use of respiratory equipment. Expect the average to come close to 1.0 ppm, but some mask time will be required for all exposures to meet 1.0 ppm 8-hr TWA and 5.0 ppm excursions (15 min.) as required by OSHA regulation. Mask time is estimated to

be about 400 manhours/week (15 %) on April 1, 1976. 150 M hrs. Oper., 250 M hrs. maintenance. Initial cost of respiratory equipment is about \$20,000. Monthly cost for canisters and compressed air is estimated to be about \$10,000. Mask time could be reduced to about 150 manhours/week if the regulation were relaxed to 2 ppm 8-hr TWA and 10 ppm TLV (15 minutes). Such a variance would be very helpful.

By April 1, 1976, about \$1.7 MM will have been spent to meet the OSHA regulation. By the end of the year this will reach about \$2 MM. In 1977 a major project, costing an estimated \$2.75 MM, to provide a VCM gas holder and modernized VCM recovery system, is planned. This is necessary from an EPA standpoint as well as a means of reducing mask time for OSHA. An added benefit of this project will be an estimated one percent increase in VCM efficiency, worth about \$200,000/year at capacity rates.

UCC 091767

This curve shows the monthly averages since October of all the analyses from the 38 sample points of the two VFA monitors in the area. These instruments provide about 40,000 analyses/month and are connected to micro-computers which automatically provide shift, daily and monthly averages of individual sample points and can be programmed to average groups of readings. The large number of timely analyses is very useful. Unfortunately, the sample locations are not always where people are, so the usefulness of calculating actual personnel exposures is limited. The range of the VFA's is set at 0 to 25 ppm. As can be seen, progress is being made in reducing the average concentrations, but it slows down as zero is approached. The average is expected to drop to near one ppm, and perhaps below, this year.

This plot is the weekly average of the reaction area VFA, which contains many of the high concentration sample points. The decreasing trend is apparent, but the up and down variations are apparent. Almost every shift sees at least one "over 25 ppm" reading.

This table shows the monthly averages of the VFA analyses for the various sections of the unit. Control rooms, remotely pressurized, are below one ppm and are a haven where masks are not necessary. The autoclave areas are relatively bad ranging up to almost 3 ppm at present. Monomer recovery areas are the worst offenders, because of leaking pump seals, compressor leakage, line openings, etc. The drying area is consistently below 1 ppm on average and is under consideration for de-regulation. VCM unloading facilities and the pilot plant average about 1 ppm. Resin storage is outside the regulated area and the sample points there are being relocated to inside the regulated area.

These are some of the projects in the Engineering program to reduce further VCM emissions and personnel exposures. Of special note:

Warning lights at each VFA sample point which will be automatically activated by the VFA when that location exceeds 5 ppm signalling the need for masks in that vicinity.

Improvements in the area of the non-solvent autoclaves. The Non-Solvent process is a difficult one from an OSHA standpoint for several reasons. 1) "Ivory" formation in the autoclaves which requires manual cleaning, 2) difficulty of sealing the agitator shafts and 3) the large amount of unreacted VCM which must be recovered.

A complete modernization of the recovery system, which is of 1948 vintage (part of the original Non-Solvent system), and including a VCM gas holder will be necessary to reduce to satisfactory levels VCM in the monomer recovery area.

Recovered monomer storage area will be improved considerably with installation of a double mechanical seal system on VCM pumps, nearing completion now.

VCM unloading emissions will be reduced with completion of a vent line this month.

Summarizes expenditures already made, including a smooth operating \$600 M vent recovery system, and also shows planned projects. Modernized slurry stripping will automate the present batch strippers and ensure compliance with proposed EPA regulations. Computerized autoclave operations will reduce operating positions and allow more "control room" time.

UCC 091772

Shows improvements in reducing residual VCM content of the resin. Reduction has been achieved mostly by modifying the existing batch strippers, but homopolymer levels have been further aided by recipe changes. The B. F. Goodrich continuous stripping system has been evaluated with the conclusion that it offers no advantage. In fact the test by B. F. Goodrich on our copolymer was unsuccessful.

In summary, it's been a tough struggle, but as has been seen, dramatic improvements have been made. A way is seen to comply with the extremely strict regulations as well as, or better than the rest of the suspension PVC industry. However, the effort will have to continue and will be never ending. As shown, additional capital expenditures will be necessary.