



Interoffice Communication

To : G. G. Draper

From : Douglas Michels

Date : January 6, 1977

Subject: CAPITAL REQUIREMENTS AND DISCUSSION OF TWO ALTERNATIVES
OF AIR PURGING FOR VCM RESIDUAL CONTROL

Early in 1977 Conoco Chemicals set a goal of developing or licensing a method of achieving a 1 ppm level in PVC resin. This goal was set because it was believed that either competition would require this level or the FDA would legislate it for pipe and food contact materials. Coincident with the 1 ppm goal in resin was the necessity to achieve a 400 ppm level in slurry, a level expected to be legislated by the EPA.

Through various testing, conducted at Aberdeen during 1976, procedures were developed to attain these goals. To meet the 400 ppm level in slurry and achieve the 1 ppm level in resin required:

1. Use of F-50 Methocel to improve the porosity of the material.
2. Use of an antioxidant to maintain product quality.
3. Steam stripping to a temperature of 225°F.
4. Subsequent air purging of the slurry in the slurry blend tanks prior to drying.

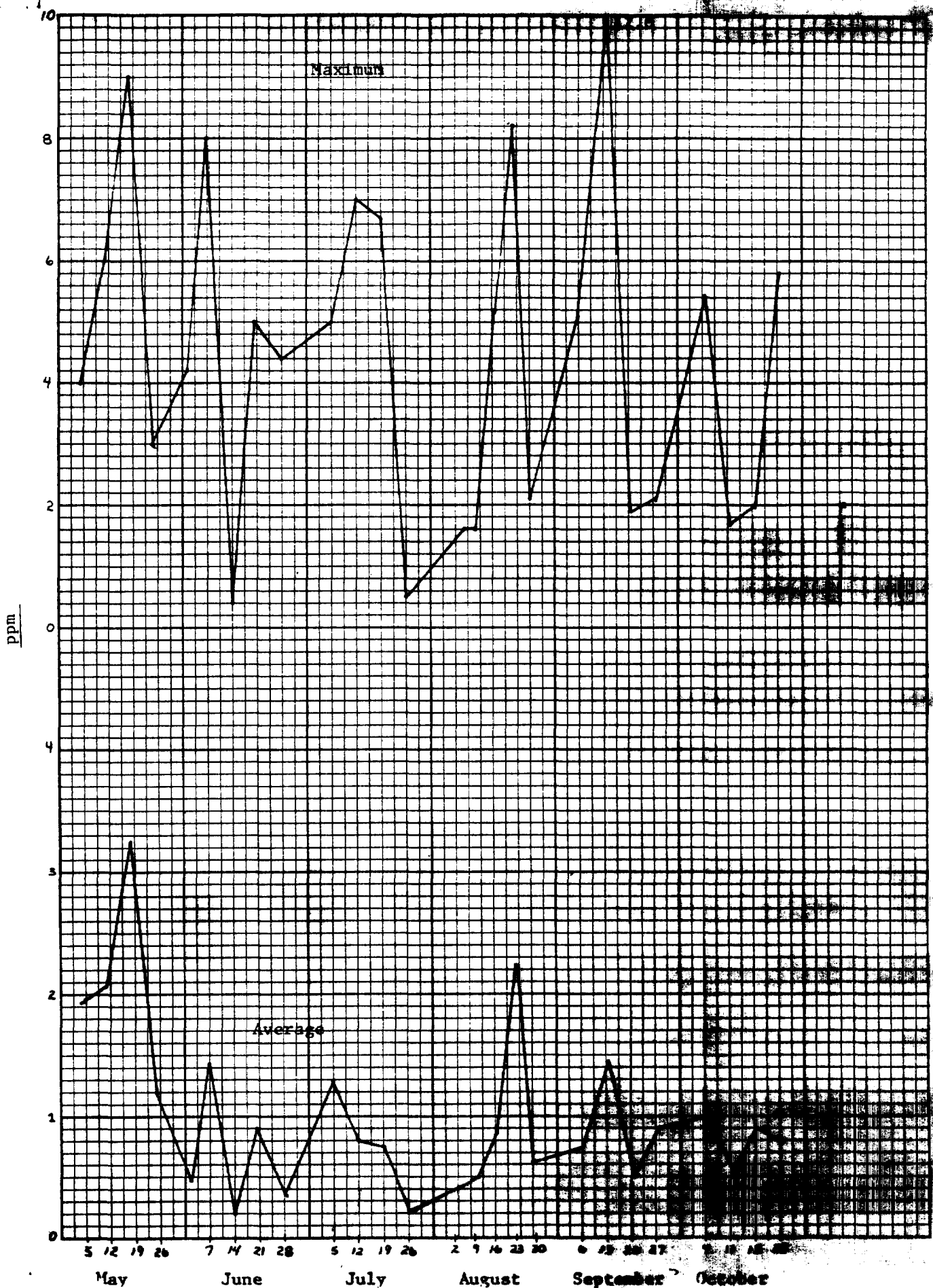
Extensive testing of the method were conducted which proved that batch-by-batch air stripping of the slurry would achieve the 1 ppm level desired. Concurrently, the 400 ppm level in slurry was also attained by the batch steam stripping procedure.

Having demonstrated the viability of batch-by-batch air stripping for 1 ppm, the Aberdeen Plant moved to install temporary blend tank air stripping as quickly as possible. Due to the shutdown of the small reactors, the Plant has a limited excess of air capacity which allowed installation of a temporary system by simply running an air header system to the various blend tanks in the V-11 Dryer Building.

The success of the temporary system was substantial in that it reduced residuals by a factor of 10 to 15. Plotted on the attached graph are the average and maximum residuals by week on shipments since the temporary blend tank air purging system was put into operation. The plotted results do not include 5305, a resin on which we do not now use F-50 Methocel. Plans are to use F-50 Methocel on 5305 in the future.

RESIDUAL VCM IN SHIPMENTS

FIGURE 1



K-E 10 X 10 TO THE INCH 46 0703
7 X 10 INCHES
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Although a level of 1 ppm residual content is being achieved most of the time on shipments, levels greater than this value still occur. The temporary system is inadequate for achieving 1 ppm at all times because:

1. The Plant does not have sufficient air capacity to properly purge the blend tanks at all times.
2. The Plant is not air purging in the batch-by-batch manner originally tested. That is, each batch is not held for 45 minutes and air purged before drying. Rather, the resin is being dried and air purged simultaneously. This leads to some product which is not below 1 ppm during the initial drying of each batch. The existing system is not capable of operation on a batch-by-batch basis, except for test purposes.

That the Aberdeen Plant had excess air capability, which allowed installation of the temporary system without capital investment, was the result of the shutdown of V-11 and V-12. With the adoption of the Capacity Replacement Project additional air capacity for properly stripping slurry in the blend tanks is required.

We have completed work on two alternative systems of providing blend tank air purging as will be required for the Capacity Replacement Project. Process designs and budget quality estimates have been completed for the two alternatives. The estimates assume internal mechanical design and Conoco installation rather than contractor work. If contractor work is required due to manpower limitations then the project costs again will be higher.

The results of the estimates of the two alternatives are:

Alternative I - \$195,000

Alternative II - \$560,000

Alternative I will install sufficient air compressor capacity to adequately air purge all blend tanks. Included is a distribution and control system for the air flow to each of the Plant's sixteen large and small blend tanks.

Alternative II includes the same system as described in Alternative I. In addition, this alternative includes pumping ability, slurry transfer distribution and control instrumentation for the batch-by-batch air stripping (as used in the test run) in four of the Plant's small blend tanks prior to transfer and subsequent drying from other blend tanks.

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The adoption of Alternative I will achieve product shipment residual values similar to those displayed on Figure 1. Results may well be somewhat improved as a more reliable and enlarged air purging source will be available. However, as depicted in Figure 1 for maximum values, there will be some shipments which have values higher than 1.0 ppm.

The adoption of Alternative II should achieve lower product shipment residual values. The testing previously done would indicate that Alternative II, properly operated and excluding upsets and malfunctions, will result in a residual content in resin of 1 ppm on all current products other than 5305.

In the event Alternative II is adopted there will be additional costs which are not reflected in the capital estimate. Batch-by-batch air stripping will require substantial operator attention. Lack of such attention will result in off spec, cross contaminated product, production delays, and insufficient air stripping. To properly function, this alternative may require additional operators specifically devoted to this function which would result in additional manpower costs. Even with additional manpower specifically devoted to this operation some amount of cross contamination, with resultant off spec material, will inevitably occur.

Alternative II also includes substantial additional operating (rotating) equipment and instrumentation. Based upon typical costs, incremental maintenance for Alternative II versus Alternative I will result in a yearly expense of \$18,300.

The installation of either Alternative I or Alternative II will require approximately one year. The limiting item will be delivery of the air compressor which is now about 44 weeks. Therefore, we need to proceed rapidly if the purging system is to be functional when the Capacity Replacement Project starts up. In light of this limited time frame we will issue to CED the definitive process design for Alternative I with directions to proceed with this system under the Capacity Replacement Project. We will have the process design finalized by January 14, 1977.

If a Business Area decision is reached that improved residuals are needed (beyond those achieved per Figure 1) and that Alternative II is required, then we can still proceed at a later date without wasting any capital. It should be noted that the reduced AFE for the Capacity Replacement Project does not appear to have sufficient funds to absorb the incremental \$365,000 required for Alternative II versus Alternative I.

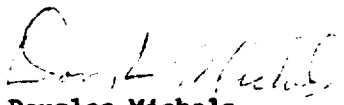
We have a number of reasons for proceeding with Alternative I instead of Alternative II at this time. These are:

1. Alternative I involves an investment needed in any event. No wasted capital is involved as the Alternative II simply involves an incremental \$365,000.

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2. The results achieved by Alternative I are sufficient to meet all OSHA requirements in our plant. This is undoubtedly also true for any of our customers.
3. Past surveys by R & D lead us to believe we are at least as good as any of our resin competitors on residual content. Furthering our lead in this area (by adopting Alternative II) may allow us to achieve a better sales advantage. This, however, is a Business Area decision requiring further definition.
4. No immediate EPA or FDA legislation on resin residuals content is expected soon. While firm information is absent, our limited indication is that a 10 ppm limit on pipe will eventually be required. This can easily be achieved, even with resin having a substantially higher residual content than 10 ppm. However, our customers will undoubtedly require certification that our resin contains less than 10 ppm to eliminate the requirement for test for residual VCM in finished pipe.
5. While the EPA promulgated their regulations on October 21, 1976, there remains some uncertainty. An environmental group (Environmental Defense Fund) has petitioned for a review. Revisions to the EPA's standards are possible. If the EPA changed their stance on the 400 ppm level, blend tank emission regulation or centrifuge emission regulation, the entire concept of our approach could be affected. Until this situation is fully clarified we need to be cautious in committing the extensive incremental capital called for under Alternative II.

As stated, we will proceed under the Capacity Replacement Project with Alternative I. We will await further input from the Business Area and management prior to committing for the additional equipment needed for Alternative II. Please inform us if this approach is unsatisfactory.


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c: RWS, ELK, RBM, RAF, ARP, JRM, MCJ

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