CELANESE CHEMICAL COMPANY
Chemcel Plant
Bishop, Texas

To: C. W. Harrison

From: W. H. Meyer WHM-69-77 June 22, 1977

Laboratory Department Summary
May, 1977

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May, 1977

The Bishop Plant Laboratory activities during May are attached. Section I contains a summary of the Analytical Group activities with a table of analytical statistics. Section II contains a Quality Assurance Summary and a table listing shipments, quality waivers, quality complaints and sample shipping statistics. Section III describes the status of Special Problems Group projects by Unit Chemist assignment. A table listing the priorities, justifications and estimated completion dates of current Special Problems projects is also included in Section III.

W. H. Meyer

WHM/jm
Attached Report

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I. ANALYTICAL GROUP

Competitive Evaluations

TMP - Samples of TMP product from Mitsubishi and Chiba Koei were received and analyzed during May. A report has been issued.

Polyol

PE - Special analytical and routine coverage of the carbon treatment of PE product has confirmed the dramatic improvement in PE natural color. Both Technical grade and Pure grade PE runs employing carbon treatment have been at <5 natural color levels (5% solution) 100% of the time.

1,3-BG - Overtime analytical coverage was provided the Unit on three occasions during the month for Unit upsets. Purity levels and odor were the problem areas.

Paraform

Methyl Formcel - Customer complaints (American Cyanamid) have prompted extensive analytical work on two areas of concern: difference of assay between laboratories, and investigations into lowering and/or eliminating present levels of methylal in our Methyl Formcel. To date, restandardizations, recalibrations, etc., have not revealed any assay problems at this location. Extra analysis has been provided for monitoring of methylal make in Formcel reactors, and G.C. columns have been provided for Special Problems section studies.

Utilities - BOD

Rainwater Runoff (Sumps) - Analyses were provided for studies of possible correlation between unit method "Quick" COD, instrument COD and TOC, to determine a rapid release method for rain and/or unit sump discharges. No good correlations were found. Present rules are that the units can release up to a 60ppm maximum TOC.

Effluent Ponds - Samples of water (inflow) from test holes drilled in the effluent pond area were checked for COD and chlorides. Results were

published in JHH-05-77. Chloride results indicate that salt-water was encountered at approximately 30-feet depth.

BOD Outfall Reuse - Special analyses were provided for the project of using BOD Unit outfall water in place of raw river-water as the diluent for BOD Unit feed streams. Base case data and actual plant raw data were collected before BOD Unit upsets stopped the program.

Oxo - n-PrOH

n-PrOH - Analyses of various tanks and towers were provided for a Propanol Unit material balance run. The generated figures were used for carbon accountability and Unit accounting purposes.

MO Units

MO-I - Extra analyses were provided for a Unit rate run on May 10, 1977. Feed streams and product storage were analyzed before and after the run to aid in accounting. This Unit startup, after its long down-time, necessitated extra analytical coverage to resolve iron and color problems in startup product.

MO-III and IV - Demineralized water "polishing" systems were installed in lines feeding these two units, necessitating various water analyses on inlet and outlet basis. The polishing beds are monitored each time they are started up or changed, and again each time the resin requires regeneration.

Erratic stabilizer levels in MO-IV product intended for shipment, have caused extra monitoring of stabilizer at the inventory point. Levels have varied from 6 - 35ppm and back.

General

Identification and initial distribution project for Capital equipment (Plastics versus Chemical) use in the Laboratory, was finished. A letter was issued, co-authored AGM-18-77, AGS-19-77.

Review of Laboratory and Section objectives was finished May 18, 1977.

All summer help is on-board this month. Mauro Castro is assigned to the Chemical Analytical section, and Randall Shafer to the Instrument Analytical section.

Safety Team inspection of the Laboratory facility was completed on May 23, 1977. Approximately 25 AVO and/or EWO's have been written to alleviate problem areas. These will be followed closely to completion.

Analytical Statistics

Sample Count		May	May Y-T-D	Previous Y-T-D
Chemical Section		4,430	25,002	20,096
Instrument Section		2,256	11,642	10,592
	Total	6,686	36,644	30,688
Technician Overtime:	Chemical	40	403	276
	Instrument	98	411	298
	Total	138	814	574

II. QUALITY ASSURANCE

Formcel - Approximately 60,000 gallons of Methyl Formcel (55%) were contaminated with Butyl Formcel. Analysis showed approximately 10% butyl alcohol. No market was found, so the material is being burned. Approximately 24,000 gallons of Butyl Formcel analyzed 3% methanol. This product will be blended off to normal levels with current production.

The American Cyanamid problem continues. To assist the customer, we are now reporting the methylal content, the pH at room temperature, and the loading temperature of each shipment to American Cyanamid.

PE - During the month, duplicate samples were taken from three PE Tech lots for an exchange analysis program with Reighhold Chemicals, Inc., Tuscaloosa, Alabama. The analyses performed were for the phthalic color, and the hot and cold sulfuric color. A set of the duplicate samples has been forwarded to Reichhold, along with our results.

Paraformaldehyde - As the result of a recent complaint from Weyerhauser (Seattle, Washington), a 2-pound sample of freshly ground Paraform fine powder has been sent to them at the request of NYQA. Recently, Weyerhauser complained that the fine powder reactivity was different. In an effort to supply their needs for powder at least 30 days old, Dr. J. C. Trebellas has set up the inventory control at the Haslett Warehouse, Oakland, California.

DAA - The current inventory of DAA has a color of 8-10 (spec is 25). The color seems to be holding at this 8-10 level. Production finished product is <5.

Formaldehyde - Blending operations have been very good during the month. Only two blends have been missed, and one blend for Plastics Mfg. (low acid <0.003) caused a 9-hour delay for two truck shipments to Plasts Mfg., Dallas. One of the two trucks was the Plastics Mfg. Co. CPU trailer, which was delayed by approval of the customer.

Propyl Acetate to Celriver - Mr. Jack Scott reported that a customer, Atlantic Solvents, serviced out of Celriver with propyl acetate produced here, reported a high value of butyl acetate. We do not have a specification for butyl acetate in 96% propyl acetate. Celriver shipped Atlantic Solvents out of Celx 11286 (shipped to Celriver March 28, 1977). This car was analyzed at the Bishop Laboratory, and was found to contain 0.20% butyl acetate. A second car, Celx 11201, shipped to Celriver April 29, contained 0.06% butyl acetate. The tank truck was returned to Celriver and replaced with material from Celx 11201.

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Sample Shipping and Quality Assurance Statistics

Sample Shipping	May	May Y-T-D	Previous Y-T-D
Domestic	116	559	524
Export	9	44	79
Plastics	7	40	80
Other	58	666	111
Total	190	1,309	794
Shipments (Number of Orders)	767	4,253	3,835
Delayed Due to Quality	2	13	16
Quality Waivers	5	15	8
Quality Complaints	6	26	8
Quality Complaints Accepted	1	10	7

Note: See attached copies of Quality Complaints and Delayed Shipments due to quality or quality waiver.

Customer Complaints Due to Quality

Date	Customer/Plant	Product	Tank Car Tank.Trailer Solids	Complaint	Comments
5-03-77	Weyerhauser Seattle, Washington	Paraform Fine Powder	-	Reactivity	Still Working
5-04-77	American Cyanamid Wallingford, Connecticut	55% Methyl Formcel	GATX 39960	High Methylal No Spec	Higher than normal content
5-06-77	Newark Terminal	55% Methyl Formcel	ACFX 12568 Shipped 4-22-77	Low Assay	Confirmed by Newark (53.15%)
5-06-77	American Cyanamid Wallingford, Connecticut	55% Methyl Formcel	Celx 12430 and Celx 3221	Low Assay (53.0 - 54.0%) and High Methylal Content	Assay Unresolved
5-17-77	Celanese c/o GATX San Pedro, California	n-Butyl Formcel	Celx 2262 Shipped Fall of 1976	Cloudy Heel	Analyzed and blended off
5-26-77	Atlantic Solvents (Supplied by Celriver)	Propyl Acetate	Celx 11286 to Celriver 3-28-77	Excessive n-Butyl Acetate Contamination	Tank car was with greater than normal amount of Butyl Acetate (0.20%), as compared to <0.1% normal level

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Quality Waivers and Shipments Delayed Due to Quality

Date	Product	Customer	Destination	Tank Car Tank Trailer Solids	Delay or Waiver	Comments
5/09/77	55% Methyl Formcel	Celanese Polymer and Specialties Co.	Louisville, Ky.	Celx 15227 (20M)	Waiver	Color of product was 12 PtCo. Authorized by J. C. Scott, NYO.
5/10/77	55% Methyl Formcel	American Cyanamid	Wallingford, Conn.	Celx 4239 (20M)	Waiver	Approval for shipment given by J. C. Scott. Methylal level at 0.65wt. %
5/10/77 - 5/16/77	Butyl Formcel	Celanese Terminal	Argo, Ill.	Celx 3262	Delayed	6 days due to high color and high acid.
5/09/77	44% Uninhibited HCHO	Plastics Mfg.	Dallas, Tx.	2 Trailers 1-CPU 1-Robertson	Delayed	9 hours due to lack of spec material.
5/13/77 - 5/18/77	PE Tech Lot 131 T_1	Newark Terminal Gen. Bonded	Newark, N. J. Charlotte, N.C.	4100 x 50lb. bags	Waiver	This lot had a higher water content than spec (0.34 - 0.37%). Spec = 0.30. Waiver approved by J.C. Scott, NYO.
5/16/77 - 5/18/77	52% HCHO	Plastics Eng. Co.	Sheboygan, Wisc.	Celx 13203 (20M)	Delayed	Order first loaded into Celx 13226. Solid particles present. Material was filtered into Celx 13202. 2 days delay.

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III. SPECIAL PROBLEMS GROUP

Methanol Oxidation, Formaldehyde Blending
A. J. Branecky

MO Efficiency Improvement with Trace Amounts of Halogenated Hydrocarbons - Wide variations in the effect of up to 30ppm methylene bromide were observed during injection into a test bank of reactors in MO-III. Throughout the testing, very poor accountability for the methylene bromide was experienced, with detectable amounts of bromide in the reactor products only rarely observed. Some corrosion of the copper inserts above the catalyst bed was observed in a reactor taken off-line. Catalyst samples and copper insert scale samples have been submitted to CCCTC for Br^- analysis.

The methylene bromide test results, to date, will be documented in a status report.

Tentative plans are to test other compounds for their effect on reaction efficiency (namely, methylene chloride and boron trifluoride, or hydrogen fluoride).

MO Catalyst Reuse - A demineralized water washed bed has been taken off-line in MO-IV after it demonstrated the life of a new catalyst charge at new catalyst efficiency. A status report will be issued. Work continues.

MS-II Crude to MO - A meeting was held to discuss plant testing of feeding crude methanol to MO. Some piping modifications in the MS Area will be necessary, along with a filter for particulate iron. Plans are to complete modifications by the end of June, and begin testing in July.

MO - New Catalyst Screening - Status unchanged.

Blending Unit Problems - Low capacity in the blending units was traced to extreme fouling of the resin beds due to lack of backwashing. Large amounts of black gelatinous material (AJB-18-76) and resin fines were removed with methanol treatment. Such treatment should not be necessary if proper backwashing is performed daily. It is reemphasized that the important backwash step should not be eliminated from the anion regeneration procedure.

Pentaerythritol, Weak Formaldehyde
H. H. Thigpen, G. R. Stasney

PE Efficiency - PE Unit efficiencies in May were lower than any previous month this year.

	Efficiency Based On	
	Acetaldehyde	Formaldehyde
YTD through April, 1977	75.2	71.0
May, 1977	70.8	68.1
YTD through May, 1977	74.2	70.4
Stretch Objectives	73.0	71.0

The primary causes of the low efficiencies in May were mechanical problems, which forced several shutdowns and startups, problems with the "B" crystallizer vacuum jets, and foaming in the "B" crystallizer. All of these problems were corrected.

The foaming in the "B" crystallizer probably occurred because the carbon bed removed the small amount of diethylene glycol dilaurate antifoam agent, which is added to the formaldehyde (HCHO) stripper columns in PE and TMP to control foaming. Some of the antifoam apparently was passing through to the "B" crystallizer, but is now removed by the carbon bed. We began (on May 23) adding the above antifoam agent to the "B" dissolve tank at a concentration of about 2ppm, which completely eliminated the foaming problem.

"A" evaporator gravity is now being controlled between 1.190 and 1.200 (as routinely determined in the Unit). This is our recommended range, based on recent lab studies, which should give maximum efficiencies when coupled with an "A" crystallizer final temperature of 70°F.

Some progress has been made in the Unit toward improved stripping of HCHO in T-286 during the recent Pure run (May 18-June 7). The T-286 residue was stripped to about 0.1% HCHO rather than the previous typical of 0.2%+ HCHO. There appears to have been an improvement in efficiencies, particularly based on HCHO. This improvement will be quantified in the future as we continue efforts to reduce HCHO in T-286 residue. T-286 is loaded out (near the flood point) during Pure runs, at high rates, which makes it very difficult to improve stripping without flooding the column. In continuing efforts, we will consider reducing or eliminating reflux, raising the feed point and preheating the feed.

No progress was made toward an improved formal hydrolysis, nor on a reaction system study to indicate whether more cooling of the reactants would be justified by improved efficiencies. These studies will be made as priorities permit.

PE Color - The carbon bed was put on line May 3 (HHT-11-77, DLS-25-77, BPH-50-77). Color of the PE product and the filtrate (BML) continues to be below our detectable limit through June 3. It now appears that an economical bed life (carbon cost) will be obtained. The carbon bed has already allowed us to strip T-286 better to improve efficiency, and to raise the pH of T-286 feed (reactor product) from 5.1-5.2 to 5.8-6.0. The higher pH will reduce our acetic acid (or formic acid) use by 30-40%. We will continue to monitor the performance of the carbon bed.

High Water During Tech Runs - Problems with "off-spec" and borderline product with respect to water content during the recent (April 19-May 18) Tech run were caused by higher than normal moisture left in the "B" filter cake. This overloaded the dryer. Data indicate that while producing Tech at high rates (9.5gpm AcH feed), the "B" cake must contain <16wt.% H_2O in order to meet the moisture spec of 0.3wt.%. The "B" cake moisture during the recent run was 16-18wt.% most of the time. Speeding up the belt made some improvement, but not enough. The filter belt was changed with no improvement. One possibility is that the quality of currently purchased filter belts is not as good as in the past. It is obvious that the capacity of the dryer is approached during Tech runs at high rates. A report will be issued.

PE Fines - No additional lab work. We have apparently done everything possible to control fines (material passing through a 200 mesh screen) without significant expenditures of manpower and money. We have made some improvement. However, there are still significant amounts of fines in both bag shipments (3-4%) and bulk shipments (5-6%). The final status report (in preparation) will update the situation and propose solutions to the problem. The next step (if justified) will be to determine the most economical solution and to implement it.

Lower Sulfate in PEAML - Virginia Chemical requires 0.5wt.% or less sodium sulfate in the AML sodium formate (dry basis) in order to avoid a processing step to remove sulfate. We typically have about 3% sodium sulfate (dry basis) during Pure runs and 0.5-1.0wt.% during Tech runs. A plant test in 1976 indicated that the <0.5wt.% target can be reached during Pure runs (the worst case) if we raise the digestor temperature from 210°F to 240°F, but product color may have increased.

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An attempt to raise the temperature (and pressure) again in late May (with the carbon bed present to remove color), failed because of leaks in a corroded line and problems with the pressure and temperature control system. A new pipe is being fabricated and the control systems put into working order. Late in June, at the end of the current Tech run, the piping will be changed out and we will operate routinely at a high hydrolysis temperature (240°-250°F) to minimize sulfuric acid requirements and, thus, reduce the sulfate content of AML. There is a very high probability that we will meet the <0.5wt.% target.

Methanol Synthesis
F. R. Dow

Fuel Gas Quality - The process analyzer for total sulfur in plant natural gas (coalescer outlet) is showing 4-5ppm total sulfur with symmetrical cycles indicating 6-8ppm sulfur. The cycles of high concentration can be seen each 3 1/2 hours ±20 minutes. These cycles were monitored for approximately 5 days.

During the investigation period, each supplier was monitored, and it was determined that Channel Gas contained the highest sulfur concentration, followed by Houston Natural Gas and Exxon. On May 17, 1977, Channel Gas contained approximately 5ppm total sulfur with cycles above 6ppm, and on May 18, 1977, Houston Natural Gas contained approximately 1.5ppm with cycles to 2.7ppm. On May 19, 1977, Exxon had the lowest sulfur concentration of the three suppliers (1ppm±0.2). The Exxon natural gas did not show cycles of higher concentrations. The entire monitoring period for the Exxon gas was stable at the 1ppm level.

Current investigations are directed toward verification of the total sulfur values by use of the Laboratory sulfur analyzer.

MS-II Analytical Support - A report was issued containing the analysis of the upper and lower draw-offs from T-280, so that a potential sale value versus fuel value may be estimated.

Esters, Methylal, Paraform, Formcels
R. G. Hilbrich

Paraform Material Balance - Progress on this project is delayed, due to lack of fulltime Process Engineering coverage on the Paraform Unit.

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Paraform, Formcels and
Ester Unit Analytical Manual - No progress was made due to priorities.

Alternate n-Butyl Acetate Process - No progress was made due to priorities.

Paraform, Formcels, Unit Support - The Laboratory is attempting to reduce or eliminate methylal as a by-product in Methyl Formcel. This attempt is due to recent quality complaints from American Cyanamid, Wallingford, Connecticut. Shipments have been running .6-.8wt.% methylal.

Numerous Methyl Formcel Unit reactor batches were monitored for methylal concentration during formaldehyde addition and reactor cooking. Methyl Formcel batches prepared in the Laboratory have also been monitored for methylal concentration. Results indicate that, in the Unit, methylal is made during both formaldehyde addition and reactor cooking.

A plant trial is being planned to add sodium hydroxide to the methanol in the reactor before formaldehyde addition. This is to increase the pH and retard methylal build. Results will be reported.

Oxo, i-Butanol, i-Propanol
A. J. Bacon

Oxo Reactor Accountability/Stability - Work proceeded to add water to the reactor in an attempt to stop foaming. Lab work had shown that small amounts of water (approximately 0.5%) stopped the foam. Distilled water was produced by the Tech Center and shipped over in a tank truck. It was added to the reactor through the rhodium addition vessel at a rate of approximately 1.5gal./min. No foam reduction was observed. The concentration of water in the catalyst only increased by approximately 0.1%. The added water was stripped out with the product as soon as it was added. (The crude product was approximately 3% water at approximately 45gal./min.)

The effect of particulate matter on foaming was investigated. Solution that was vacuum filtered at ambient temperature through a 2 micron filter did not foam, but this was undoubtedly due to gas stripping by the vacuum. A pressure filtration apparatus was set up and catalyst was again filtered. This time, no decrease in foaming tendencies were observed. It was concluded that particulate matter >2 microns did not cause foaming.

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T-229 Aldol - No work done due to priorities.

Oxo, Butanol, Propanol Support -

1. Samples of CO_2 from S.E.C. Corp. and Chemetron were analyzed as possible girdler feed to increase BuH production. No halide (<0.3ppm), sulfur (<0.1ppm) or hydrocarbons (<50ppm) were found. Probably CO_2 from either supplier is O.K.

2. Samples of rhodium fines from the reactor were sent to the Tech Center for x-ray analysis. Iron was found to be a major component (8% by Bishop Lab analysis).

3. Ten gallons of catalyst were sent to P.G.P. Industries for rhodium recovery trials.

Trimethylolpropane
D. W. Harris

TMP Unit Support - The Unit was down most of the month for scheduled maintenance and cleaning. Problems with operation of the finishing column on startup, which resulted in low assay (98.2wt.% TMP) and high water content (0.04wt.%), were corrected by Operations.

A joint report (with H. H. Thigpen) was issued (DWH-08-77, HHT-10-77) recommending reinstigation of development work on differential MeOH process analyzers for control of caustic addition to the PE and TMP reactors.

TMP Unit Analytical Methods - Work continues as time permits.

V-747 Residue Hydrolysis - Status unchanged.

Sartomer Color Problem - Crystallization from ethyl acetate is the only purification method discovered to date, which will improve the quality of our TMP to meet Sartomer's specs. Emphasis is being placed on generating sufficient crystallization data for a preliminary process design and economics. A report outlining all work done on this project will be written after crystallization work has been completed.

1,3-Butylene Glycol
J. W. Hermann

1,3-BG Carbon Accountability - A joint report with Process Engineering (D. LeBlanc) on the plant trial and estimated cost of the program has been submitted to Process Engineering for publication.

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1,3-BG Efficiency - No progress was made due to time devoted to Unit support.

1,3-BG Unit Analytical Manual - A rough draft of a revised methods manual has been written. A final draft will be submitted for publication as soon as possible.

1,3-BG Unit Support - Laboratory work was begun to reduce foaming in the acetaldehyde recovery column (T-135). Initial results confirm that water concentration of feed is directly related to foaming. Future work will attempt to identify the cause of high-foaming during Unit upsets. Anti-foaming agents will also be tested. Initial literature research found that Dow Corning Anti-foam A was initially recommended and used in T-135 until 1975, when use of diethylene glycol dilaurate was begun. Studies will also be made to reduce steam usage in the Unit and to reduce effects of T-135 upsets. Use of vapor sidestream product from T-135 to feed hydrogenation reactors will be explored.

Problems during May with T-135 operation were determined to be caused by high water in feed. Water levels of >30% were found in T-135 feed on June 6. Normal water levels range between 10% and 15%. High water produced extremely high foaming in T-135. The water level was decreased by reducing water flow to the acetaldehyde scrubber (T-220). A program will be developed to monitor water content of T-135 feed daily, and a letter will be published.

The Unit experienced problems with high 2-ethyl-1,3-butylene glycol (2-Et-BG) production during the week of May 16. Apparent cause was a severe over-aldoling on May 14 due to mechanical failure. An aldol reactor acid quench system would have been capable of minimizing effects of the upset. Both heavy ends recycle (T-227 residue) and light ends recycle (T-227 distillate) were discontinued to bring 1,3-BG product to 99.50% assay. A letter describing the upset has been submitted for publication.

Alternate TMP Purification System - Work is pending receipt of additional needed equipment.

Utilities, Raw Materials, BOD
M. F. Brady

Purchase Specifications Update - No progress was made due to priorities.

Demineralizer Support - The following problems were encountered with the demineralizer:

1. High sodium leakage from polisher.

2. Polisher resin contained mixture of approximately 50% SAC resin.

3. SAC was missing 70ft^3 of resin. Upper laterals and header were bent.

4. Polisher acid inlet flange gasket was blown.

5. Sodium analyzer had a bad control board.

The Laboratory assisted Operations and Process Engineering in resolving these problems.

A block flow regeneration was attempted on the SAC bed. Considerable trouble was encountered in maintaining flows and acid concentrations during the trial. Permanent piping and flow regulators have been requested for future attempts at block flow regeneration.

The MO-III and MO-IV demineralizer guard beds (T-230 and V-46) were set up for service. The Laboratory assisted Operations in putting these vessels into service.

Utilities Support - Work continues.

The Laboratory was represented at a presentation and tour of the DuPont Ingleside Plant, on reverse osmosis. The Coal Study Team is looking at reverse osmosis at a possible alternative to our present water treatment system.

BOD Support - A plant trial run was started on Friday, May 13, 1977, to test recycling of BOD outfall water. Base case data was gathered until Monday, May 23, 1977, when the outfall recycle water addition to the equalization basin was started. Recycle water addition continued (batch-wise) until Monday, June 6, 1977.

The BOD Unit began to get upset toward the end of May. By Monday, June 6, the Unit was in a badly upset condition. Operations desired to end the recycle to get the Unit out of the upset.

There is inconclusive evidence as to the cause of the upset. Laboratory data show that the TSS and VSS in the equalization basin stayed within

the base case range until the last week when it went slightly higher. On June 6, the VSS and TSS of the clarifier outfall were quite high.

The Laboratory agreed with Operations that the recycle should be stopped until the Unit could recover from the upset. The Laboratory believes that the recycle did not start the upset, and that a new trial is needed.

Waste Heat Recovery of T-205 Overhead - No progress was made due to priorities.

BOD Unit Analytical Methods Manual - No progress was made due to priorities.

Anaerobic Pilot Testing
of Chemcel Waste Streams - The CCCTC determined that at the concentration (80ppm) of HMDA that would be fed to an anaerobic unit, no reaction of HMDA with formaldehyde would occur. At much higher concentrations (>200ppm) a reaction would form a precipitate.

It was desired to run the Anaerobic Unit at design of 16,000ppm COD feed for three weeks. It was decided to spike the samples to bring the COD to 16,000. The CCCTC would analyze for concentrations of these components: formaldehyde, methanol, butanol, trioxane and 1,3-dioxolane. The sample would be spiked to bring these components to their average concentration during the period December 20, 1976 to March 14, 1977. This would give a COD of 11,500ppm COD. The remaining components should bring the COD to 16,000. If not, the sample would be further spiked with methanol until 16,000 COD was achieved.

It was not necessary to spike the first two weeks' samples. The first week had 16,300 COD and the second was 28,000 COD.

The Anaerobic Unit is running fine. Sampling continues.

Addition of Betz Neutrameen
to the Plant Steam System - Work restarted on this project with the hope of beginning addition of Neutrameen on June 13. Samples were started and more base case data gathered. Work continues.

Elimination of Lamella Underflow - Preliminary work has been done to familiarize the Unit Chemist with operation of the Lamella separator. Work continues.

Evaluation of IRA-94 and
Ionac AFP-329 for Formaldehyde Service - No progress was made due to priorities.

Water Treatment Analytical
Sampling and Testing Update - No progress was made due to priorities.

Identification of all Waste Streams - All streams have been identified in the Chemical Company. Identification of streams in the Plastics Company remains to be completed. Project is delayed until meetings can be arranged with the Plastics Company.

1,3-BG Unit Support - Backup support for BG was provided while the Unit Chemist was on vacation. A problem occurred with low BG assay and high acetal in the finished product. The Laboratory suggested breaking the T-227 overhead recycle and adding more catalyst. These measures were followed and the product came back on specification in three days.

OSHA Monitoring
J. M. Jackson

Paraform Area - The following samples were taken for benzene exposure during hand dumping of benzene-contaminated trioxane.

1. Control Room
2. Unit Laboratory
3. V-5 Melt Tank
4. Operator Helpers

These samples have been analyzed and results issued.

Main Laboratory -

Plastics Section - Technician peak exposure to benzene was obtained during the 2-hour handling of routine trioxane-benzene samples from the Plastics Company. Results are reported in the benzene status report.

Chemical Section - The Laboratory janitor was resampled for benzene exposure while disposing of trioxane-benzene samples for the Plastics Company.

Chemical Company unit laboratories equipped with Karl Fisher apparatus have been evaluated for benzene exposure. Data will be reported.

Plastics Company - Eight-hour time weighted averate, area and perssonnel samples were taken in Trioxane-I and Trioxane-II areas, and of Plastics Company Maintenance personnel working in these areas. Results are reported in the benzene status report.

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Diacetone Alcohol
A. R. Hancock

DAA Unit Support - The DAA Unit suffered low efficiencies during portions of May (90% versus 92% plan efficiency). To determine where the losses were, several sets of vent samples were taken on T-285 and T-294 vacuum jets. The analysis of the first set of samples showed high total carbons (TC): T-285, 3.3% TC; T-294, 14.5% TC. The condensers for both T-285 and T-294 vacuum jets were vibrated with pneumatic air vibrators. Analysis of T-285 and T-294 jet vent samples after the air vibration showed lower total carbons for T-294 (approximately 8.8% TC). High TC was also found in T-295 residue (3.5% versus <1.5% for normal conditions). The base temperature of T-295 was raised and caustic was added to raise the pH above 12.0. With the base temperature raised and the pH above 12.0 the possibility of acetone in T-295 residue was remote. The 295 residue TC dropped to 1.0%.

DAA Laboratory Study - No progress was made due to priorities.

DAA Daily Carbon Accountability - A plant trial of the daily loss accountability procedure outlined in RML-15, JMJ-19-76, was conducted for 5 days in May. Carbon accountability for the trial varied from 97-102%. A report estimating the cost of implementing the procedure and the results of the trial will be issued.

Component Analysis of
T-285 and T-294 Jet Vent Samples - As requested by Process Engineering, component analysis of T-285 and T-294 jet vent samples were run. Process Engineering is exploring the possibility of recovering T-285 and T-294 jet exhausts to increase unit efficiency. A report will be issued by Process Engineering.

Improved Utilization of Yield Accounting Efficiency Data
B. C. Kerr

The daily efficiency reported by Yield Accounting for each of the operating units provides an important measure of the performance of Operations. A report is in preparation which shows that the data, as reported by Yield Accounting, can be used to provide a clearer understanding of unit operations. The report will compare the daily report data with 3-day and 5-day moving averages; cumulative performance versus standard efficiency; and, finally, it will illustrate the advantages of using a control chart type presentation as an accurate guide to long term unit operations.

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Miscellaneous

Dave Harris attended Professional Employees Learning Laboratory at Columbia Lakes.

Gary Boyd and Ron Hilbrich made a customer service call on Methyl Formcel to American Cyanamid in Wallingford, Connecticut.

Jim Jackson attended the American Industrial Hygiene Conference.

Current Special Problems Projects

Project	Chemist	Priority	Justification	Estimated Completion Date
MO Efficiency Improvements With Trace Amounts of Halogenated Hydrocarbon	Branecky	1	Raw Material Savings	Plant Test Complete by July 1, 1977
MO New Catalyst Screening		2	To Establish Alternate Suppliers and Improve Catalyst Quality	Continuing
MO Catalyst Reuse		2	Reduce Ag Inventory	September 1, 1977
MS-II Crude to MO		1	Steam Savings	July 1, 1977
Water Injection to MO		2	Steam Savings	August 1, 1977
PE Efficiency	Thigpen	1	Raw Material Savings Plus Increased Capacity 4-8% Potential Increase	September, 1977
PE Unit Support		1	Maintenance of Business	Continuing
Lower Sulfate in PEAML		1	Comply With Virginia Chemical Company Request	July 1, 1977
PE Fines		1	Maintenance of Business	July 1, 1977
PE Color (Evaluate Carbon Bed Performance)		1	Maintenance of Business	Continuing
Fuel Gas Quality	Dow	1	Improve Fuel Gas Accountability	Continuing

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Current Special Problems Projects

Project	Chemist	Priority	Justification	Estimated Completion Date
MS-II Analytical Support	Dow	1	Maintenance of Business	Continuing
Paraform Material Balance	Hilbrich	2	Possible Raw Material Savings	November 1, 1977
Paraform-Formcel Support		1	Maintenance of Business	Continuing
Alternate n-Butyl Acetate Process		1	Steam Savings	November 1, 1977
Paraform, Formcels, Ester Unit Analytical Methods		1	Maintenance of Business	August 1, 1977
Oxo Reactor Accountability/Stability	Bacon	1	Improved Reactor Control and Analytical Balance	Continuing
Oxo, Butanol, Propanol Support		1	Maintenance of Business	Continuing
T-229 Residue Aldol		2	Raw Material and Possible Steam Savings	June 1, 1977
Sartomer Color Problem	Harris	1	Increased TMP Sales (Potential 500M lbs./yr.)	July 1, 1977
TMP Unit Support		1	Maintenance of Business	Continuing
TMP Unit Analytical Methods Manual		2	Maintenance of Business	September 1, 1977

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Current Special Problems Projects

Project	Chemist	Priority	Justification	Estimated Completion Date
T-206 and V-759 Vent Emission	Harris	2	To Ensure TACB Compliance	Unknown - Work Pending Piping Changes
V-747 Residue Hydrolysis	↓	2	Raw Material Savings	Unknown
1,3-BG Efficiency	Hermann	1	Raw Material Savings	December 1, 1977
1,3-BG Unit Analytical Manual		1	Maintenance of Business	July 1, 1977
1,3-BG Unit Support		1	Maintenance of Business	Continuing
Alternate TMP Purification System	↓	1	Raw Material Savings	December 1, 1977
Demineralizer Support	Brady	1	Maintenance of Business	Continuing
Utilities Support		1	Maintenance of Business	Continuing
BOD Support		1	Maintenance of Business	Continuing
Evaluation of Rohm and Haas IRA-94 and Ionac AFP-329 For Formaldehyde Service		2	Resin Cost Savings	December 31,1977
BOD Analytical Methods Manual	↓	2	Maintenance of Business	December 31,1977

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Current Special Problems Projects

Project	Chemist	Priority	Justification	Estimated Completion Date
Anaerobic Pilot Testing of Chemcel Waste Streams	Brady	1	To Test Anaerobic Process as Alternate BOD Expansion	December 31,1977
Addition of Betz Neutrameen to The Plant Steam System		1	Reduce Steam System Corrosion	August 1, 1977
Waste Heat Recovery of T-205 Overhead		2	Energy Savings	December 31, 1977
Purchase Specification Update		1	Maintenance of Business	August 31, 1977
Elimination of Lamella Underflow		1	WTTF Objective	January 1, 1978
Water Treatment Analytical Sampling and Testing Update		1	Maintenance of Business	August 31, 1977
Identification of all Waste Streams		1	WTTF Objective	December 31, 1977
OSHA Monitoring	Jackson	1	Ensure Employee Health and Safety OSHA Complaiance	Continuing
DAA Unit Support	Hancock	1	Maintenance of Business	Continuing
DAA Laboratory Reactor Study		1	Increase Unit Capacity and Steam Savings	September 1, 1977
DAA Daily Carbon Accountability		1	Possible Raw Material Savings	July 1, 1977

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Current Special Problems Projects

Project	Chemist	Priority	Justification	Estimated Completion Date
Component Analysis of T-285 and T-294 Jet Vent Samples	Hancock	1	Increase Unit Efficiency	June 15,1977

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