

CELANESE CHEMICAL COMPANY
Chemcel Plant
Bishop, Texas

To: Dr. R. R. Graham

From: G. D. Boyd GDB-127-81 July 8, 1981

Laboratory Department Summary
June, 1981

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A summary of each group's monthly report is attached. Section I contains a summary of the Quality Assurance and Analytical Group activities with tables of analytical statistics, shipments, quality waivers, quality complaints and sample shipping statistics. Section II describes the status of Special Problems Groups and Staff Chemist projects by chemist assignment. A table listing the priorities, justifications, and estimated completion dates of current Special Problems projects is also included in Section II.

G. D. Boyd

GDB:jr

003525

HIGHLIGHTS

- Removal of the distillation column false bottom and filler under it has resulted in product color improvement at MO III.
- Anaerobic filter outfall and 101 outfall analyses of 6-15 and 6-22 showed no detectable fecal coliform. Weekly samples will continue to be sent for analysis to confirm these results.
- Preliminary flocculating agent testing for aerobic unit upset outfall solids control has resulted in a recommendation for a Plant trial.
- Bench scale studies have shown biological treatment of solar pond inventories and retrieval well effluent to be infeasible .
- Plant nitrogen contamination has stopped. Analysis indicated the presence of GE-60. Operations identified a MO III blowcase as a potential source of contamination.
- Polyol and VCI waste treatability studies are being formulated.
- The laboratory study of the PE formal strong acid plus resin catalyzed hydrolysis system was completed. The resin was used for the total equivalent of 309 days (∿10.1 months) and 189 days (∿6.1 months) since reactivation. No loss in activity has been detected.

I. ANALYTICAL GROUP

Competitive Products

None this month.

Methanol Oxidation (MO)

The Analytical Section is providing iron and calcium analyses on a once per week basis on the methanol feed to each MO unit. (Samples taken before and after the resin beds.) This is to monitor the crude MeOH feed quality and the resin bed efficiencies.

Methanol Synthesis (MS)

Methanol - The Instrument Section provided analyses on T-288 lower drawoff over a thirteen day period for a wide range of heavy metals. The only elements found in significant amounts were iron and calcium. Iron levels ranged from ~0.2 ppm to 1.6 ppm. Calcium ranged from 0.06 ppm to 0.1 ppm. This work was requested to determine if this stream was a contributor to the increase in color in formaldehyde from the MO units.

Polyol Area

Pentaerythritol (PE) - The Instrument Section analyzed five samples of PE "dust" collected in the bagging machine dust collector. Additional samples have been taken and a report will be issued upon completion of the analytical work.

The Instrument Section has completed the analyses on forty-nine samples taken across Tech PE lots 81-157-1T and 81-158-3T to determine the variability within lots on a regular Tech-grade run. This study was requested by the Dallas office. A report will be issued.

Utilities and BOD

Turbidity of the Plant drinking water is being checked on a Monday through Friday basis. After enough data has been gathered to establish the normal level, a maximum limit will be set for Utilities Department alert.

Special Analytical Assignments

VCI Effluent Analysis (F. R. Dow, B. W. Wise) - VCI effluent samples were obtained for analysis, evaluation, and comparison with a sample of the PE evaporator vent. Analysis of the VCI samples (Plant effluent, aeration pond, and solar pond) determined that the Plant effluent had a COD of 14780 ppm, the aeration pond 6424 ppm and the feed to the solar pond 4032 ppm. The PE evaporator vent COD was 3280 ppm. A letter has been issued detailing the analytical results.

Gordon Halbut - MS Analytical Review (F. R. Dow) - Gordon Halbut, Analytical Lab Supervisor-Edmonton, was given a tour of the Laboratory and MS Unit. The purpose of his visit was to familiarize and obtain analytical procedures for the Canadian MS startup and routine operation.

Celcon Effluent Streams (F. R. Dow, B. W. Wise) - Capillary column GC scans were obtained from five Celcon effluent streams. The five samples were weekly composites blended in the Celcon Laboratory from 301 Res., TO-1, TO-2, SH-2, and MH-2. The five samples were analyzed for TEA, HCHO, MeOH, MeAc, TO and tetraoxane. Some of the high component concentrations were: 278 ppm TEA, 890 ppm HCHO in 310 Res. and 4368 ppm HCHO, 571 ppm MeOH, 390 ppm TO in TO-2. These five samples will be analyzed for several weeks to determine trends and base case data for Celcon effluents.

Analytical General

Group technicians and chemists attended a two day in-house seminar presented by Varian Instruments. Subjects included GC packed column vs. capillary column capabilities, detector specifications and derivative preparation and analysis.

Specialized equipment is being ordered to facilitate Laboratory determination of fecal coliform bacteria in the Plant 101 outfall. Chlorination of this outfall is being monitored.

Plant tank car cleaning rack is switching washing soaps from Electrosol to Spillclean #8 LFA. Electrosol was not available in bulk quantities. Performance to date is good with an added advantage in soap costs of ∿$0.40/car versus a previous ∿$0.80/car.

Customer Complaints

1. 6-25-81 - Hooker Chemical, North Tonawonda, N.Y. - complained of 50% HCHO arriving with a "yellow" color. Car #'s Celx 13227 and Celx 13286 - customer kept product.

2. 6-29-81 - Acme Resin, Forest Park, Ill. - complained of 50% HCHO arriving with a "yellow" color. Car # Celx 13279. Customer kept product.

These cars will be inspected upon return for possible lining failure.

Quality Waivers

1. 6-5-81 - Iso Butyl Acetate - 192,940 lbs. to Celanese-Newark Terminal, Iso Butyl Alcohol content = 0.5% vs. Max. of 0.50 wt.% - QD

2. 6-8-81 - Para C-Powder- 2,500 lbs. to Plastics Engineering, Inc., Kilgore, Texas - Iron content = 2.4 ppm vs. max. spec. of 2.0 ppm. SQD

3. 6-10-81 - Para C-Powder - 45,000 lbs. to Taker Chemicals, Inc., Pratt, Kan. and Oklahoma City, Okla. - Iron content @ 2.4 ppm vs. max. spec. of 2.0 ppm. SQD

4. 6-24-81 - n-Butyl Acetate - 193,740 lbs. to Celanese Newark Terminal - Iso Butyl Acetate content = 0.23 vs. max. of 0.10 wt.%. QD

5. 6-26-81 - n-Butyl Acetate - 195,100 lbs. to Celanese Celriver Terminal - Iso Butyl Acetate content = 0.23 vs. max of 0.10 wt.%. QD

6. 6-29-81 - n-Butyl Acetate - 194,300 lbs. to Celanese San Pedro, California - Iso Butyl Acetate content @ 0.22 vs. max. of 0.10 wt.% QD

7. 6-29-81 - n-Butyl Acetate - 73,900 lbs. to McKesson Chemical Co., Greensboro, N.C. - Iso Butyl Acetate content @ 0.22 vs. max. of 0.10 wt.%. QD

Product	% QD[1] Month	% QD YTD	% SQD[2] Month	% SQD YTD
Para F-Powder	0	1.5	0	2.5
Para C-Powder	0	0	37.4	4.8
Diacetone Alcohol	0	1.8	0	0
Formaldehyde	0	0.3	0	0
n-Butyl Acetate	30.4	2.5	0	2.3
Sodium Formate	0	0	0	1.7
Pentaerythritol Tech (Lube Grade as Tech)	0	0	0	1.7
Iso Butyl Acetate	19.4	4.4	0	0

[1] = Lbs. of product shipped out of Manufacturing Control Specification vs. total lbs. of that product shipped for month and ytd.

[2] = Lbs. of product shipped out of Sales Specification vs. total lbs. of that product shipped for month and ytd.

Analytical Statistics

	June	June YTD	Previous YTD
Sample Count			
Chemical Section	5368	27845	29231
Instrument Section	3363	15858	15036
Total	8731	43703	44267
Technician Overtime			
Chemical Section	51	432	521
Instrument Section	7	214	215
Total	58	646	736
Sample Shipping			
Domestic	65	363	406
Export	9	30	15
Plastics	1	7	49
Others	8	59	44
Total	83	459	514
QA Statistics			
Shipments	769	4007	5016
Waivers (QD)	5	10	6
Waivers (SQD)	2	8	4
Complaints	2	5	20

II. SPECIAL PROBLEMS GROUP

Process Technology
B. C. Kerr

Injection Well Compatability - URM, Inc., has determined that pH adjustment will not be required for solar pond feed to a deep well disposal system provided an adequate buffer zone is established. Therefore, the problems associated with neutralization do not require further work.

Insoluble particulates must be removed from liquids prior to injection well disposal. The maximum particle size allowable may be as large as 5μ; however, for safety, Process Engineering wants to design a system which will remove particulates larger than 2μ. Preliminary lab studies show that Pond 10 and 11E in September of 1980 contained ∿300 ppm of solids retained on a 2μ filter. It is assumed that the filterable solids content of solar pond material will vary with time, depending upon evaporation rates. Laboratory support for the design of an adequate filter system is continuing.

Monitor Well Analytical Data - The accumulation of analytical data from monitor wells continues. Four months of data (February through May) have been examined. Wide variations in the composition of uncontaminated well water, in addition to variances related to sampling and analysis, indicate that a large number of separate analyses will be required to establish any kind of trend.

Methanol Oxidation, Formaldehyde Blending
T. A. Jasek, D. T. Biernacki, J. D. Presley, R. L. Day

Color Problems (Jasek) - Color problems at the MO units have subsided somewhat. MO II and MO IV product formaldehyde colors range from 5 to 6 while MO III product colors range from 6 to 8. Although somewhat higher than MO II and MO IV, the product color at MO III is substantially lower after the false bottom in the distillation column (T-313) was removed. No problems have been encountered since the false bottom was removed.

The origin and identity of the color species continues to elude discovery. Samples analyzed by the CCCTC GC-mass spectrometer showed no differences in MeOH's which produced colored or non-colored formaldehyde. Work is continuing.

Color Development Testing (Presley) - To determine if various feeds into MO III were causing high color, a color development test was set up. The following streams were added to MO IV product HCHO at the 0.4% and 2% level, T-288 upper drawoff, T-288 lower drawoff, crude MeOH prior to MO unit resin bed, crude MeOH after resin bed, MO III vaporizer blowdown, T-314 product (possibility of cooling water leak), DI water, and a pair of blanks. After four days at 145°F no color development was observed. Raising the temperature to 170°F for one day again produced no color change. Finally, the concentrations of the 2% set were raised to 6% and the temperature raised to 190°F for one day with no color development. Samples of MO IV HCHO were also spiked with 0.8, 4, and 8 ppm calcium with no color development at the above conditions.

HCHO samples spiked with 0.8 and 4 ppm iron immediately developed colors of 25 and 100+, respectively.

Also, a qualitative study was set-up with the Analytical Section to determine if HCHO samples were colored by iron or other metals. For five days all 50% HCHO samples brought to the Wet Lab with a color of 5 or greater were treated with 50 ppm EDTA (EDTA complexes many metals into a non-colored species) and the colors reread. It was found that only a few of the tested samples showed a color reduction. Work continues.

Crude Methanol (Jasek) - The Laboratory continues to monitor the methanol losses from the absorber vent. These results are being transmitted to Operations.

Evaluation of Silver Use Program (Jasek) - Data gathering is being completed. The results are expected to be published in the near future.

Laboratory MO Micro Unit (Jasek, Biernacki) - The Laboratory MO micro unit was revamped and started up. The initial run indicated the operation to be comparable to when the unit was last run. Various catalyst evaluations will now begin with this tool available.

MO Unit Support (Jasek) - The Laboratory conducted AMR's at MO III on June 5, 1981:

	AMR	
Train	Indicated	Analytical
A	.92 - .96	1.19
	.83 - .86	1.07
B	.84 - .88	1.13

HCHO Stabilizer Study
R. L. Day

Formaldehyde samples containing various amounts of metalose and polyvinyl alcohol-metalose stabilizer were set up this month. This study is designed to test several factors:

1. Higher concentrations of metalose stabilizer will be tested. Previous work revealed that the average 12 ppm metalose in HCHO shipments may not be the optimum.

2. Higher concentrations of the PVOH/metalose stabilizer mix will be tested. Also, different ratios will be tested. Previous work used only 1:5 and 1:3 ratios of PVOH:metalose, and used a total concentration maximum of 12 ppm.

3. The reason for the difference in stability between HCHO directly off the finishing column and HCHO which has passed through the resin bed will be determined.

   Possible reasons could be sodium contamination from the resin bed, lower acid in the HCHO off the resin bed, or slight age differences between the HCHO from the two different sources.

4. Finally, the stability of the HCHO from the crude methanol feed run will be determined.

   All of the HCHO samples are stored at 40°C and are checked twice a week.

BOD, Utilities

S. G. Smith, P. W. Young, D. R. Akin, J. D. Presley

BOD II Support (Smith) - Continued support was provided during the startup of the BOD II anaerobic-aerobic system. Oxo sump was added to the feed on 6-4-81. The back ditch and front ditch diversions have been rerouted to the BOD surge pond (instead of solar ponds) since 5-30-81. Analysis of back ditch samples have shown it to be a low COD stream. Analysis of front ditch samples indicate a high level of sulfates (800-1600 ppm) which could cause problems resulting from elevated H_2S production in the anaerobic filter. This work is to be documented.

Input was provided for the BOD II startup status report.

Fecal Coliform in 101 Outfall (Smith) - The 101 outfall continues to be chlorinated to maintain fecal coliform less than 200 count/100 ml. Samples of the anaerobic recycle and 101 outfall after Cl_2 of 6-15 and 6-22 showed no detectable fecal coliform, however, weekly samples will be monitored.

Flocculating Agents as Settling Aids (Smith) - Laboratory tests have shown total suspended solids in the BOD outfall can contribute to 25-40% of the outfall COD, at times. Investigations have indicated that treatment with ppm levels of polyelectrolyte flocculants can improve sludge flocculation and settling, thereby removing suspended solids and COD from the outfall. Results of this study have been submitted.

Use of VCI Centrate Incineration Na_2CO_3 in BOD Anaerobic Filter (Smith) - Investigated feasibility of using VCI centrate incineration residue Na_2CO_3 as Na^+ source (buffering) in the anaerobic filter. Results are to be documented.

Solar Inventory and Retrieval Well Aerobic Treatability (Young) - Solar inventory and retrieval well treatability studies have been completed. This waste was not treatable in laboratory units. A report is to be written.

Polyol Treatability in BOD II (Young) - A laboratory anaerobic-aerobic system will be fed polyol sump waste at current BOD II organic loading (≅0.2 lbs. COD/ft^2/day) to verify its treatability. Samples are currently being collected.

Virginia Chemical Co, Inc. Waste Treatability (Young) - Virginia Chemical Company, Inc. (VCI) waste will be fed to our anaerobic-aerobic system to study its treatability in the BOD II system. Samples of VCI waste have been analyzed, and the program is being set up at this time.

BOD II Aerobic Optimization (Young) - Three aerobic systems are being operated to find the optimum sludge age for the BOD II aeration basins.

Anaerobic-Aerobic Treatment of Solar Pond Inventory and Retrieval Well Effluent (Akin) - Anaerobic-aerobic treatment of solar pond inventory and retrieval well effluent was determined not to be technically feasible due to poor COD removal efficiency. Therefore, the study was discontinued. The two filters are presently being acclimated to BOD II feed.

TPP and TPPO (and P_4O_{10}) Emissions From the Waste Liquid Boiler (Akin) - A GC method to analyze for TPP and TPPO in minute quantities (<5 ppm) is being developed. This method will be used to quantify TPP and TPPO (and P_4O_{10}) emissions from the present waste liquid boiler.

Analysis of Liquid in Plant Nitrogen Lines (Akin, Presley) - The liquid in the Plant nitrogen which was causing problems at the Paraform Unit, was determined to contain GE-60 antifoam. This determination enabled Operations to locate a potential source of contamination at MO III. The contamination has now stopped.

Methanol Synthesis
J. C. Bustabad

MEA Corrosion - A letter detailing the Laboratory screening of sodium metavanadate, a potential MEA corrosion inhibitor, was issued.

MEA Analyses - MEA from the 5MM Girdler system was put in storage during the Girdler turnaround in March. Its suitability for reuse is being studied. Evaluation of this MEA showed concentrations of thiocyanantes, hydrogen sulfide, and metal sulfides to be negligible. A sample of this material was sent to CCCTC for COS evaluation by GC/MS. Results are pending.

Reprocessing of MEA Contaminated MeOH - Operations personnel have requested a laboratory distillation to determine the feasibility of processing the 23.5M gallons of contaminated methanol in V-645 and V-650. This study is under way.

CO_2 Sulfur Contamination - A June 17th check by Dräger showed undetectable levels of H_2S in 5MM and 2MM recycled CO_2 streams.

Oxo, Butanol
J. D. Presley

Reactor Stability/Accountability - Wide variations in butyraldehyde and TPP concentrations were indicated by analysis. However, reactor operation has been fairly smooth. Work is under way to better define reactor composition.

Rhodium Accountability - Run VII rhodium accountability is favorable through mid-June. A slight drop has been noted. Work is in progress to confirm losses. Rhodium losses in T-210 Res. total 4.93 pounds RTD (6-26-81).

Improved Rhodium Recovery - Run 6 MEA contaminated catalyst has been successfully treated with 10% and 20% phosphoric acid (H_3PO_4) as described last month. After treatment with 20% H_3PO_4 and two water washes (2 catalyst vols./1 H_3PO_4 or water vol.) a sample was propylene extracted (1 vol. of catalyst/10-15 vols. of propylene) which resulted in a measurable activity improvement. Catalyst activities of various samples are reported below:

Sample	Activity	Foaming
1. MEA contaminated Run 6	0.84	Ref. to 1
2. MEA Run 6 treated w/20% H PO	0.81	Same as 1
3. " " & 1:10 w/propylene	0.91	Better
4. " " & 1:15 w/propylene	0.94	Better
5. Run 6 catalyst prior to MEA	1.06	Same
6. Fresh Run 7 catalyst	1.02	Worse

Rough foaming tests gave the above results. Varying composition of the samples is believed to be the reason for Run 7 catalyst showing worse foaming. Work is under way to confirm present results.

Butanol Unit Support - To determine economics of BuOH recovery from the unit hi-pressure vent system, Process Engineering requested analysis of knock-out pot liquid. The sample brought to the Laboratory consisted of two phases. The phases were separated and analyzed. The combined phases contained ∿55% BuOH and ∿44% water and 1-2% miscellaneous organics. The total sample weight was 38.55 grams. Results have been given to Process Engineering.

Acetates, Paraform, Formcel® Products
J. E. Russell

Unit Support - None provided.

1,3-Butylene Glycol
J. E. Russell

T-223 Fouling - A sample of solids found in the T-223 reboiler were analyzed to try to identify the source of the fouling. The analysis showed ≅8.4% Na_2CO_3, ≅14.6% NaAc, and ≅17.7% NaOH. This accounts for 61% of the solids. About 2% of the solid cake was heavy organics. The remainder of the

cake is not accounted for, but visual inspection indicates some Raney Ni catalyst.

Another sample of foreign material in T-223 was analyzed to indicate the origin. That analysis showed 48% Fe, 6.9% Ni, and 0.2% Mo. This is primarily corrosion products with some Raney Ni catalyst. The molybdenum may come from the molybdenum promoted Raney Ni.

V-778 Residue Burning - Analysis of the residue on the filters during the May Plant trial to burn TMP and BG residue streams showed 18 wt.% Ni and 5 wt.% Na. The residue plugged the filters and forced termination of that Plant trial. The TMP residue stream (V-747 Residue) is presently being burned in a resumption of the Plant trial without V-778 residue. The filters have been changed once in three weeks, again due to plugging. This time, the residue showed 6.6% Ni and .4% Na. The source of the Ni has not been determined, but it may be a residual from the previous Plant trial.

Spot samples of V-778 residue during June showed an average of 2.60 wt.% ash with a range of 1.49-3.72 wt.% ash on specific samples. The Ni level averaged 635 ppm with a range of 380-1016 ppm. Sodium levels averaged 8350 ppm, ranging from 6220 to 10,170 ppm on the same samples. The NaAc levels corresponding to the above Na^+ values would range from 2.2 wt.% to 3.6 wt.%, with an average of 2.97 wt.%. The NaAc levels calculated by Na content are considerably lower than those calculated assuming all of the ash is due to NaAc. Based on ash, the NaAc would have to range from 3.94-9.84 wt.%, with an average of 6.88 wt.% NaAc in V-778 residue.

Aldol Reactor Fouling - A sample of the wash water from the 1st and 2nd stage Aldol reactors was analyzed for Ac^- and $CO_3^=$. Based on filling the reactors to 85% of capacity with wash water, the analysis showed that there was 2.8 lb. NaAc and 7.0 lb. Na_2CO_3 in the 1st stage reactor, 1st wash. The 2nd wash was only analyzed for $CO_3^=$, and it showed 20.0 lb. Na_2CO_3. The 2nd stage, 1st wash showed 5.0 lb. NaAc and 15.0 lb. Na_2CO_3 while the 2nd wash showed 16.6 lb. Na_2CO_3. There was a heavy organic substance in the 1st wash also, but it was not identified or quantified. It appeared to be aldol heavy ends.

AcH Feed - The delivered AcH has shown a significant decline in acid and high boiler content since lined tank car deliveries began on 6-18-81. The first eight tank cars delivered AcH with an average of .015 wt.% acid and 0.105 wt.% high boilers. The average delivered AcH for the period 5-14-81 to 6-11-81 in unlined tank cars was .021 wt.% acid and 0.24 wt.% high boilers.

It is planned to monitor the AcH storage tanks for acid and high boilers. This program will get under way soon.

Pentaerythritol

L. M. Harvey, B. K. Huelle, J. E. Russell

Tech-grade PE Quality (Harvey) - Tech-grade PE lot #81-157-1T was sampled at 3-pallet intervals during bagging to determine intralot variation. Five samples were also collected from every fifteenth pallet to determine intrapallet variation. The di-PE content varied over a range of 7.2 to 11.7 wt.% across the lot. The widest variation within a pallet spanned 1.7 wt.%. A report has been written (LMH-93-81).

Recover PE from VCI Extraction Waste Stream (Harvey) - Shake-out studies were performed on the residue stream from VCI's bench-scale wiped film evaporator using water, PE WIP recycle, Acetone, n-Butyl alcohol, iso-Propyl alcohol and 2-Ethylhexanol. The recovered solids ranged in purity from 55 wt.% mono-PE (using water) to 84 wt.% mono-PE (using n-Butyl alcohol). Recovery efficiencies were 25-40%. These results were inconclusive since the sample of organic residue used in these experiments was probably not typical (it contained a large amount of 2-Ethylhexylamine (2EHA), the VCI extraction solvent). No further work is planned using this atypical material. ∿50 lbs. of organic residue was obtained in late June and will be analyzed for 2EHA to determine if it is suitable for future experiments or if further solvent removal will be required.

VCI will be operating their bench-scale extraction unit during the week of July 13-17. Plans are to obtain the organic extract from this operation to use in studies of possible PE recovery schemes instead of using the wiped-film evaporator residue.

Analyses were performed for VCI on a sample of AML used in their extraction studies (LMH-92-81). VCI currently does not have an analytical method for separating PE-type compounds.

PE Dust Characterixation (Harvey) - Particle-size distribution was determined on several samples of PE dust to compare it with a 300-mesh PE currently marketed by Hercules and IMC. The particle-size distribution was found to be variable (LMH-91-81). Work is in progress to further characterize our PE dust and its variability.

Recovery of PE from AML Using XAD-7 Resin (Harvey) - Based on a patent application by VCI, a sample of PE "A" Mother Liquor (AML) was passed over a bed of Rohm and Haas XAD-7 resin for removal of impurities in the PE-sodium formate solution. No change was seen in the AML in the first fractions collected (2-3 bed volumes) except for a slight color removal. No further work is planned.

PE Formal Hydrolysis (Russell) - The Laboratory work on the hydrolysis sistem is complete. The system promotes the hydrolysis of PE mono Linear Formal with a strong acid ion exchange resin and a strong acid as co-catalyst. The resin bed has been used for the equivalent of 309 days (∿10.1 months), or 189 days (∿6.1 months) since reactivation. There has been no detectable loss of activity.

The resin bed hydrolysis apparatus will remain in place, but will not be run unless other tests are needed.

Approximately 5.0 pounds of Tech-PE was made in the Laboratory from PE unit "A" cake, resin bed hysrolysis, Calgon activated carbon treatment, filtering, and crystallizing. The crystals were washed with chilled DI water and dried in a vacuum oven. This product should simulate unit PE when the resin bed is installed. The PE from this process, both Tech and PE (prepared last month), were sent to Summit June 12th for product testing to determine if any undesirable changes in the product will occur with the new hydrolysis scheme. The analysis of both the Pure and Tech PE prepared were typical compared to unit product.

Minimizing the UV Absorbance at 220 nm in Pure PE (Huelle) - A letter compiling all work done to date on this Du Pont specification problem has been published (BKH-04-81). In order to prove that low levels of formose sugars and their precursors exist in formaldehyde, I will use a Pierce Chemical Company GC method of sugar detection (This method has been employed at the Tech Center). I am currently awaiting reagents needed for this method.

Trimethylolpropane

R. L. Day, B. K. Huelle

T-312 Extractor Concentration Profile (Day) - At the request of Process Engineering, a concentration profile on the T-312 extractor in the TMP Unit was performed. Phasing characteristics of each sample and operating conditions of the column at the time of sampling were also collected. A letter has been written and is under review. This data should be used to aid in designs of the extractor for a future expansion.

Based on the present data, the Laboratory recommends that Plant trials be held to evaluate lowering the wash water feed point by four trays, from Tray 50 to Tray 46, and raising the decanter recycle five trays from Tray 21 to Tray 26. This work can be combined with other extractor optimization studies, such as changing the temperatures of the feed(s) to reduce losses out the residue.

Effect of NaFo on TMP Decomposition (Huelle) - Laboratory experiments simulating the TMP HCHO stripper column and V-747 vacuum flasher were conducted. The stripper column experiments at 150°C and 5% NaFo show no decomposition after 6 hours heating time. Experiments simulating V-747 at 210°C were done at 100 and 500 ppm NaFo. No decomposition occurred in the 100 ppm experiments after 6 hours. Decomposition did occur in the 500 ppm experiment after 3 hours heating time. A letter will be published on this work in July.

Methanolysis of TMP (Day) - A recent economic study of a proposed methanolysis of TMP heavy ends to recover TMP from the formals determined the process was not economically feasible. A cursory review of the process was begun in an attempt to generate new ideas on ways to improve the economics of the process.

Environmental Health
C. E. Gary, K. V. Parker

The solids removed from the water in the asbestos pit were analyzed and found to contain asbestos. (KVP)

The Plant-wide formaldehyde exposure follow-up sampling continues and is approximately 75% complete. (KVP)

Additional personal noise exposure samples were obtained to provide a better statistical evaluation. The initial Plant-wide noise survey is now complete. (CEG-41-81, KVP-12-81)

A Metronics Model 450 Dynacalibrator has been ordered to provide dynamic atmospheres to standardize industrial health analyses. (CEG)

Several respirable dust personal exposure samples were obtained in the ABI sand blasting yard. (CEG)

The NIOSH Method using impregnated charcoal and ion chromatography to determine formaldehyde exposures has been tested and the results are erratic and inconclusive. No further work is planned. (CEG)

A personal CO exposure survey has been completed in the MS and Oxo Units and will be reported. (CEG)

Special Problems General

Susan Smith transferred to H. H. Thigpen's group effective July 1st.

Current Special Problems Projects

Project	Chemist	Priority	Justification	Estimated Completion Date
BOD II Optimization	Young	1	MOB	October, 1981
Polyol Treatability	↓	1	MOB	October, 1981
VCI Waste Treatability	↓	2	MOB	October, 1981
TMP - Extractor Optimization	Day	1	Raw Material Savings	August, 1981
New Formaldehyde Stabilizer System	↓	1	MOB	August, 1981
OSHA Monitoring	Gary	1	Insure Employee Health and Safety - OSHA Compliance	Continuing
Develop an Improved Hydrolysis System for PE Linear Formal	Russell	1	Steam, Acid, and Capital Savings	September, 1981
Eliminate or Reduce the Salt Content on V-778 (1,3-BG heavy ends) to Allow it to be Burned Without Excessive Particulate Emissions.	↓	1	Solve Environmental Problems and Recover Energy by Burning Stream.	August, 1981
Develop a Way to Monitor Conversion in the PE Reaction System	Huelle	1	MOB (Quality) and Raw Materials	September, 1981
Determine the Potential of PE Dust for Use as Lube Grade PE - Assist Production personnel as Needed.	Harvey	1	Supply Growing Market for PE	July, 1981
Recover PE from VCI Extraction Process Organic Stream	↓	1	Raw Materials Savings	November, 1981

Current Special Problems Projects

Project	Chemist	Priority	Justification	Estimated Completion Date
Run VI Catalyst Cleanup and Reactivation	Presley	1	Raw Materials Savings.	September 1, 1981
MO Catalyst Screening	Jasek	1	To establish alternate catalyst	Continuing
Formaldehyde Product Color	↓	1	MOB	September, 1981
GC Methanol Oxidation Reactor Optimization		2	Catalyst Evaluation for Possible Efficiency Improvements	September 1, 1981
Modified Silver Catalyst		1	Catalyst Efficiency Improvements	January 1, 1982
Silver Rewashing Improvements		1	Efficiency Improvements and Raw Material Savings	September 1, 1981
Sinter Test Evaluation	Glenister	1	Establish Alternate Suppliers	September 1, 1981
TPP, P_2O_5 Emissions	Akin	2	Emissions Quantification	October 1, 1981
Vacuum Truck Characterization	↓	1	WMSTF Support	September 1, 1981
Sulfur Adsorbents for Methane Feed	Bustabad	1	Reduce sulfur contamination of Reformer catalyst.	September 1, 1981
$Ni(CO)_4$ Method Evaluation	↓	2	Determination of Method's accurancy.	September 1, 1981

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Current Special Problems Projects

Project	Chemist	Priority	Justification	Estimated Completion Date
Solar Pond Disposal	Kerr	1	MOB	September 1, 1981

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TO - AS LISTED*

FROM - G.D. BOYD GDB-126-81 6/28/81

BISHOP SHIPMENT QUALITY DATA REPORT

ATTACHED ARE YEAR-TO-DATE REPORTS OF CRITICAL ANALYSES FOR BISHOP PLANT SHIPMENTS. THESE ARE TO BE DISTRIBUTED EVERY FOUR OR FIVE WEEKS. NO STATISTICAL FORMULAS ARE INVOLVED IN THESE DATA. THEY REPRESENT STRICTLY ARITHMETIC AVERAGES AND ABSOLUTE VALUES FOR THE YEAR-TO-DATE. THE AVERAGES ARE NOT WEIGHTED. SPECIFICATION LIMITS ARE SHOWN.

NO ANALYSES FROM PREVIOUS YEARS ARE INCLUDED IN THE DATA PRESENTED. ALL EARLIER DATA HAVE BEEN ERASED FROM THE COMPUTER FILE STORAGE AND REPORTS WILL NOW SHOW ONLY THOSE OCCURRENCES DURING THE CALENDAR YEAR FOR WHICH THE REPORT IS RENDERED. AT THE END OF EACH YEAR THE DATA WILL BE ERASED FROM THE COMPUTER FILE STORAGE AND A NEW ARITHMETIC AVERAGE BEGUN. FOR COMPARING PLANT QUALITY PERFORMANCES FROM YEAR TO YEAR, IT WILL BE NECESSARY TO RETAIN THE LAST REPORT FOR EACH YEAR. WEEKLY AVERAGES ARE MAINTAINED AT THE PLANT LABORATORY. COPIES MAY BE OBTAINED ON REQUEST.

G.D. BOYD
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BISHOP PRODUCT SHIPMENT STATISTICAL DATA

YEAR TO DATE

PERIOD ENDING 6/26/81

PRODUCT	COMPONENT	SPEC	AVERAGE	RANGE	HIGH	LOW	SHP
37% HCHO-U	HFO, WT%	0.020MAX	0.0041	0.0090	0.0100	0.0010	45
37% HCHO-U	MEOH,WT%	1.000MAX	0.4275	0.6000	0.8000	0.2000	45
37% HCHO-I	HFO, WT%	0.020MAX	0.0042	0.0080	0.0080	0.0020	45
37% HCHO-I	MEOH,WT%	6.500MIN	7.0067	1.2000	7.8000	6.6000	45
37% HCHO-I	HFO, WT%	0.020MAX	0.0041	0.0080	0.0090	0.0010	63
37% HCHO-I	MEOH,WT%	12.000MIN	13.2492	2.6000	15.0000	12.4000	63
44% HCHO-U	HFO, WT%	0.030MAX	0.0051	0.0100	0.0120	0.0020	62
44% HCHO-U	MEOH,WT%	1.500MAX	0.4919	0.4000	0.7000	0.3000	62
44% HCHO-I	HFO, WT%	0.030MAX	0.0175	0.0010	0.0180	0.0170	2
44% HCHO-I	MEOH,WT%	6.000MIN	6.6000	0.2000	6.7000	6.5000	2
45% HCHO-U	HFO, WT%	0.030MAX	0.0038	0.0040	0.0060	0.0020	16
45% HCHO-U	MEOH,WT%	1.500MAX	0.5562	0.3000	0.7000	0.4000	16
46.5%HCHOU	HFO, WT%	0.030MAX	0.0046	0.0080	0.0100	0.0020	75
46.5%HCHOU	MEOH,WT%	1.500MAX	0.5293	0.5000	0.8000	0.3000	75
50% HCHO-U	HFO, WT%	0.050MAX	0.0065	0.0190	0.0200	0.0010	247
50% HCHO-U	MEOH,WT%	1.500MAX	0.5526	0.5000	0.8000	0.3000	247
52% HCHO-U	HFO, WT%	0.050MAX	0.0076	0.0120	0.0150	0.0030	27
52% HCHO-U	MEOH,WT%	1.500MAX	0.5852	0.6000	1.0000	0.4000	27
ME-FMCL	H2O, WT%	10.000MIN	10.5612	1.0000	11.0000	10.0000	203
ME-FMCL	COLOR,PC	10.000MAX	5.5764	4.0000	9.0000	5.0000	203
ME-FMCL	HFO, WT%	0.040MAX	0.0085	0.0130	0.0160	0.0030	203
ME-FMCL	IRON,PPM	0.500MAX	0.1429	0.3000	0.4000	0.1000	203
ME-FMCL	NA, PPM	NONE	103.2611	92.0000	150.0000	58.0000	203
E-FMCL	METAL,WT%	NONE	0.0457	0.2700	0.2800	0.0100	203
BU-FMCL	H2O,WT%	6.500MIN	6.9671	0.9000	7.5000	6.6000	120
BU-FMCL	COLOR,PC	10.000MAX	5.5000	3.0000	8.0000	5.0000	120
BU-FMCL	HFO,WT%	0.030MAX	0.0097	0.0180	0.0220	0.0040	120
BU-FMCL	NA,PPM	NONE	112.2833	144.0000	196.0000	52.0000	120
BU-FMCL	MEOH,WT%	NONE	0.1581	0.3800	0.3900	0.0100	120
BUH-REG	BUH,WT%	98.500MIN	99.6300	0.0000	99.6300	99.6300	1
BUH-REG	HBU,WT%	0.500MAX	0.0500	0.0000	0.0500	0.0500	1
BUH-REG	COLOR,PC	5.000MAX	5.0000	0.0000	5.0000	5.0000	1
BUH-REG	IBUH,WT%	0.500MAX	0.2200	0.0000	0.2200	0.2200	1
BUH-PVH	BUH,WT%	99.500MIN	99.8027	0.3600	99.9200	99.5600	79
BUH-PVH	HBU,WT%	0.150MAX	0.0906	0.1200	0.1500	0.0300	79
BUH-PVH	COLOR,PC	5.000MAX	5.0000	0.0000	5.0000	5.0000	79
BUH-PVH	IBUH,WT%	0.500MAX	0.0489	0.1900	0.2000	0.0100	79
ISOBUH	IBUH,WT%	94.000MIN	96.8174	1.9700	97.6900	95.7200	65
ISOBUH	H2O,WT%	3.000MAX	2.0115	1.2800	2.6500	1.3700	65
ISOBUH	BUH,WT%	2.000MAX	0.9320	1.4300	1.9000	0.4700	65
NAFO-TMP	NAFO,WT%	59.000MIN	60.4092	7.1300	64.8400	57.7100	96
NAFO-PCAML	NAFO,WT%	NO PRODUCT SHIPMENTS THIS PERIOD					
MEOH-SHIP	MEOH,WT%	99.850MIN	99.9699	0.0600	99.9800	99.9200	532
MEOH-SHIP	KMNT,MIN	50.000MIN	85.2256	40.0000	110.0000	70.0000	532
MEOH-SHIP	HF55,WT%	0.003MAX	0.0005	0.0005	0.0010	0.0005	532
MEOH-SHIP	H2O,WT%	0.100MAX	0.0164	0.0790	0.0800	0.0010	532
MEOH-SHIP	ETOH,PPM	750.000MAX	121.3496	177.0000	227.0000	50.0000	532
BUOH-SHIP	BUOH,WT%	99.800MIN	99.8958	0.1100	99.9500	99.8400	212
BUH-SHIP	H2O,WT%	0.100MAX	0.0160	0.0500	0.0600	0.0100	212
BUH-SHIP	DBE, WT%	0.050MAX	0.0144	0.0100	0.0200	0.0100	212

BISHOP PRODUCT SHIPMENT STATISTICAL DATA
YEAR TO DATE
PERIOD ENDING 6/28/81

PRODUCT	COMPONENT	SPEC	AVERAGE	RANGE	HIGH	LOW	SHPT
BUOH-SHIP	IBOH,WT%	0.150MAX	0.0610	0.1100	0.1200	0.0100	212
BUOH-SHIP	BUH,WT%	0.010MAX	0.0100	0.0000	0.0100	0.0100	212
13BG-SHIP	13BG,WT%	99.500MIN	99.7314	0.3300	99.9000	99.5700	73
13BG-SHIP	H2O,WT%	0.500MAX	0.0263	0.0900	0.1000	0.0100	73
13BG-SHIP	2EBG,WT%	0.400MAX	0.1612	0.2300	0.3000	0.0700	73
13BG-SHIP	BGAC,WT%	0.200MAX	0.0834	0.1500	0.1600	0.0100	73
PRAC-SHIP	PRAC,WT%	96.000MIN	97.5873	1.3200	98.3400	97.0200	60
PRAC-SHIP	PROH,WT%	4.000MAX	2.3622	1.3300	2.9500	1.6200	60
PRAC-SHIP	H2O,WT%	0.100MAX	0.0113	0.0200	0.0300	0.0100	60
PRAC-SHIP	HAC,WT%	0.010MAX	0.0020	0.0040	0.0050	0.0010	60
BUAC-SHIP	BUAC,WT%	99.500MIN	99.6617	0.3700	99.7900	99.4200	165
BUAC-SHIP	HAC,WT%	0.010MAX	0.0014	0.0050	0.0060	0.0010	165
BUAC-SHIP	H2O,WT%	0.100MAX	0.0151	0.0500	0.0600	0.0100	165
BUAC-SHIP	COLOR,PC	10.000MAX	5.0000	0.0000	5.0000	5.0000	165
NOT REPORTED		NO PRODUCT SHIPMENTS THIS PERIOD					
IBUAC-SHIP	IBAC,WT%	99.000MIN	99.3551	0.9800	99.5000	98.5200	39
IBUAC-SHIP	H2O,WT%	0.100MAX	0.0136	0.0300	0.0400	0.0100	39
IBUAC-SHIP	HAC,WT%	0.010MAX	0.0022	0.0050	0.0060	0.0010	39
IBUAC-SHIP	COLOR,PC	10.000MAX	5.0000	0.0000	5.0000	5.0000	39
IBUAC-SHIP	IBOH,WT%	0.500MAX	0.3538	0.7400	0.8600	0.1200	39
DAA-SHIP	HAC,WT%	0.010MAX	0.0016	0.0020	0.0030	0.0010	47
DAA-SHIP	H2O,WT%	0.100MAX	0.0253	0.0500	0.0600	0.0100	47
DAA-SHIP	COLOR,PC	25.000MAX	5.9787	12.0000	17.0000	5.0000	47
DAA-SHIP	ACET,WT%	0.500MAX	0.1432	0.1700	0.2300	0.0600	47
DAA-SHIP	MS-D,WT%	0.500MAX	0.1923	0.4100	0.4700	0.0600	47
DAA-SHIP	DAA,WT%	98.500MIN	99.4554	0.5300	99.6500	99.1200	47
MEAL-SHIP	MEAL,WT%	97.000MIN	98.7677	1.5400	99.4000	97.8600	14
MEAL-SHIP	H2O,WT%	1.500MAX	1.1514	0.7900	1.3800	0.5900	14
MEAL-SHIP	HAC,WT%	0.010MAX	0.0019	0.0020	0.0030	0.0010	14
MEAL-SHIP	HCHO,WT%	0.100MAX	0.0114	0.0200	0.0300	0.0100	14
MEAL-SHIP	MEOH,WT%	2.000MAX	0.0693	0.7500	0.7600	0.0100	14
PARA-FLK-L	HCHO,WT%	91.000MIN	92.1688	1.9800	92.9900	91.0100	645
PARA-FLK-L	HFO,WT%	0.030MAX	0.0141	0.1300	0.1400	0.0040	645
PARA-FLK-L	IRON,PPM	2.000MAX	0.5637	1.8000	1.9000	0.1000	645
PARA-FLK-HA	HCHO,WT%	95.000MIN	95.3439	0.9200	95.9800	95.0600	10
PARA-FLK-HA	HFO,WT%	0.030MAX	0.0124	0.0110	0.0190	0.0080	10
PARA-FLK-HA	IRON,PPM	2.000MAX	0.8300	0.8000	1.2000	0.4000	10
PARA-CPWD-L	HCHO,WT%	92.000MIN	94.5155	2.6600	96.0000	93.3400	50
PARA-CPWD-L	HFO,WT%	0.030MAX	0.0141	0.0100	0.0200	0.0100	50
PARA-CPWD-L	IRON,PPM	2.000MAX	1.3560	1.9000	2.4000	0.5000	50
PARA-FPWD-L	HCHO,WT%	95.000MIN	95.9034	2.0600	96.9600	94.9000	88
PARA-FPWD-L	HFO,WT%	0.030MAX	0.0119	0.0180	0.0210	0.0030	88
PARA-FPWD-L	IRON,PPM	2.000MAX	1.3420	4.5000	5.0000	0.5000	88
PARA-FPWD-L	SIEVE-%	90.000MIN	97.3121	6.6000	99.2000	92.6000	88
PE-PURE-L	H2O,WT%	0.200MAX	0.0693	0.1400	0.1600	0.0200	320
PE-PURE-L	ASH,WT%	0.010MAX	0.0019	0.0090	0.0100	0.0010	320
PE-PURE-L	M-PE,WT%	98.000MIN	98.9673	1.7100	99.9100	98.2000	320
PE-PURE-L	EFML,WT%	1.000MAX	0.2995	0.8300	0.8400	0.0100	320
-PURE-L	2PE,WT%	1.500MAX	0.5708	0.8900	0.9000	0.0100	320
-PURE-L	3PE,WT%	0.200MAX	0.0152	0.0900	0.1000	0.0100	320

BISHOP PRODUCT SHIPMENT STATISTICAL DATA

YEAR TO DATE

PERIOD ENDING 07/28/81

PRODUCT	COMPONENT	SPEC	AVERAGE	RANGE	HIGH	LOW	SHP
PE-PURE-L	MCF,WT%	NONE	0.1990	0.2900	0.3400	0.0500	127
PE-TECH-L	OH,WT%	47.900MIN	48.6020	1.9100	49.8100	47.9000	282
PE-TECH-L	H2O,WT%	0.300MAX	0.2547	0.1700	0.3500	0.1800	282
PE-TECH-L	ASH,WT%	0.010MAX	0.0025	0.0080	0.0090	0.0010	282
PE-TECH-L	M-PE,WT%	86.000MIN	87.7260	3.5600	89.7800	86.2200	282
PE-TECH-L	FMLS,WT%	2.000MAX	0.7849	1.8000	1.9000	0.1000	282
PE-TECH-L	2PE,WT%	12.000MAX	9.3508	3.8800	11.0300	7.1500	282
PE-TECH-L	3PE,WT%	3.000MAX	1.7681	1.4400	2.5200	1.0800	282
PE-TECH-L	MCF,WT%	NONE	0.1986	0.5100	0.5400	0.0300	128
TMP-M-SHIP	TMP,WT%	98.000MIN	99.1239	0.9400	99.4400	98.5000	45
TMP-M-SHIP	H2O,WT%	0.050MAX	0.0214	0.0600	0.0700	0.0100	45
TMP-M-SHIP	HFO,WT%	0.003MAX	0.0018	0.0020	0.0030	0.0010	45
TMP-M-SHIP	DIOL,WT%	NONE	0.0464	0.1400	0.1500	0.0100	42
TMP-M-SHIP	MCF,WT%	NONE	0.3562	0.5800	0.6700	0.0900	42
TMP-M-SHIP	2TMP,WT%	NONE	0.0476	0.0900	0.1000	0.0100	42
TMP-LOT	TMP,WT%	98.000MIN	99.0564	1.6200	99.7100	98.0900	427
TMP-LOT	H2O,WT%	0.050MAX	0.0251	0.0467	0.0500	0.0033	427
TMP-LOT	HFO,WT%	0.003MAX	0.0020	0.0020	0.0030	0.0010	427
TMP-LOT	DIOL,WT%	NONE	0.0462	0.2500	0.2600	0.0100	427
TMP-LOT	MCF,WT%	NONE	0.3733	0.9300	0.9600	0.0300	427
TMP-LOT	2TMP,WT%	NONE	0.0679	0.5600	0.5700	0.0100	427
MO1-254R	HCHO,WT%	NONE	50.8895	25.3700	53.0800	27.7100	78
MO1-254R	HFO,WT%	NONE	0.1427	7.9720	8.0000	0.0280	79
MO1-254R	COLOR,PC	NONE	6.3210	7.0000	12.0000	5.0000	81
MO1-254R	NA,PPM	NONE	0.1310	1.2000	1.3000	0.1000	42
MO1-254R	IRON,PPM	NONE	0.1098	0.2000	0.3000	0.1000	41
MO2-297R	HCHO,WT%	NONE	51.0502	13.4900	54.3000	40.8100	159
MO2-297R	HFO,WT%	NONE	0.0672	0.4110	0.4400	0.0290	158
MO2-297R	COLOR,PC	NONE	5.3815	12.0000	17.0000	5.0000	173
MO2-297R	NA,PPM	NONE	0.1100	0.9200	1.0000	0.0800	155
MO2-297R	IRON,PPM	NONE	0.1209	1.3000	1.4000	0.1000	153
MO3-313R	HCHO,WT%	NONE	51.5049	10.4800	54.9800	44.5000	172
MO3-313R	HFO,WT%	NONE	0.0463	0.0850	0.1110	0.0260	169
MO3-313R	COLOR,PC	NONE	6.5735	18.0000	23.0000	5.0000	204
MO3-313R	NA,PPM	NONE	0.1114	0.7400	0.8000	0.0600	173
MO3-313R	IRON,PPM	NONE	0.1188	0.6200	0.7200	0.1000	170
MO4-272R	HCHO,WT%	NONE	51.5532	5.5100	53.6800	48.1700	175
MO4-272R	HFO,WT%	NONE	0.0488	0.0530	0.0890	0.0360	175
MO4-272R	COLOR,PC	NONE	5.2381	7.0000	12.0000	5.0000	189
MO4-272R	NA,PPM	NONE	0.1096	1.3000	1.4000	0.1000	164
MO4-272R	IRON,PPM	NONE	0.1045	0.5000	0.5400	0.0400	166
SHIP-HCHO	MECL,PPM	8.120RANG	12.0224	57.9500	59.0000	1.0500	185
MEOH-2RBOM	H2O,WT%	0.100MAX	0.0084	0.0830	0.0840	0.0010	27
MEOH-2RBOM	ETOH,PPM	750.000MAX	51.4800	51.0000	85.0000	34.0000	25
MEOH-2RBSS	H2O,WT%	0.100MAX	0.0316	1.4490	1.4500	0.0010	180
MEOH-2RBSS	NESS,WT%	0.003MAX	0.0005	0.0025	0.0030	0.0005	184
MEOH-2RBSS	ETOH,PPM	750.000MAX	153.0584	318.0000	358.0000	40.0000	154
PRAC-P-STG	PRAC,WT%	96.000MIN	97.5611	2.2100	98.8300	96.6200	33
RAC-P-STG	PROH,WT%	4.000MAX	2.4021	2.4100	3.3200	0.9100	33
RAC-P-STG	H2O,WT%	0.100MAX	0.0119	0.0200	0.0300	0.0100	32

BISHOP PRODUCT SHIPMENT STATISTICAL DATA

YEAR TO DATE

PERIOD ENDING 6/28/81

PRODUCT	COMPONENT	SPEC	AVERAGE	RANGE	HIGH	LOW	SHP
PRAC-P-STG	HAC,WT%	0.010MAX	0.0010	0.0010	0.0020	0.0010	32
PRAC-P-STG	HIGH,WT%	NONE	0.0109	0.0200	0.0300	0.0100	33
PRAC-P-STG	PRPR,WT%	NONE	0.0100	0.0000	0.0100	0.0100	33
PRAC-P-STG	HUAC,WT%	NONE	0.0248	0.1700	0.1800	0.0100	33
HUAC-P-STG	HUAC,WT%	99.500MIN	99.6522	0.9700	99.8900	98.9200	175
HUAC-P-STG	HAC,WT%	0.010MAX	0.0013	0.0230	0.0240	0.0010	176
HUAC-P-STG	H2O,WT%	0.100MAX	0.0147	0.1300	0.1400	0.0100	177
HUAC-P-STG	PRAC,WT%	NONE	0.0139	0.1500	0.1600	0.0100	171
HUAC-P-STG	TBAC,WT%	0.300MAX	0.1076	0.4600	0.4700	0.0100	175
HUAC-P-STG	HIGH,WT%	NONE	0.1826	0.8700	0.9100	0.0400	174
HUAC-P-STG	HPRO,WT%	NONE	0.0313	0.4500	0.4600	0.0100	174
IBUAC-PSTG	IBAC,WT%	99.000MIN	99.4072	1.7900	99.8600	98.0700	41
IBUAC-PSTG	H2O,WT%	0.100MAX	0.0229	0.4200	0.4300	0.0100	38
IBUAC-PSTG	HAC,WT%	0.010MAX	0.0026	0.0480	0.0490	0.0010	38
IBUAC-PSTG	IBOH,WT%	0.500MAX	0.3451	1.2900	1.3500	0.0600	41
IBUAC-PSTG	PRAC,WT%	NONE	0.0100	0.0000	0.0100	0.0100	41
IBUAC-PSTG	HUAC,WT%	NONE	0.2066	0.8200	0.8300	0.0100	41
IBUAC-PSTG	IBPR,WT%	NONE	0.0100	0.0000	0.0100	0.0100	41
DAA-PSTG	HAC,WT%	0.010MAX	0.0013	0.0060	0.0070	0.0010	118
DAA-PSTG	H2O,WT%	0.100MAX	0.0235	0.1030	0.1100	0.0070	120
DAA-PSTG	CHLOR,PC	25.000MAX	5.1667	13.0000	18.0000	5.0000	120
DAA-PSTG	ACET,WT%	1.000MAX	0.1636	0.2400	0.2800	0.0400	121
DAA-PSTG	MS-D,WT%	0.500MAX	0.2340	0.7100	0.7600	0.0500	121
AA-PSTG	DAA,WT%	98.000MIN	99.3846	1.0500	99.7700	98.7200	121