

CELANESE CHEMICAL COMPANY
Chemcel Plant
Bishop, Texas

To: C. W. Harrison

From: W. H. Meyer- *By*

WHM-24-77

March 15, 1977

Laboratory Department Summary
February, 1977

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PLAINTIFF'S
EXHIBIT

CEL-237

CELANESE CHEMICAL COMPANY
Chemcel Plant
Bishop, Texas

To: C. W. Harrison

From: W. H. Meyer

WHM-24-77

March 15, 1977

Laboratory Department Summary
February, 1977

Bishop Plant Laboratory activities during February are attached. Section I contains a summary of the Analytical Group activities with a table of analytical and sample shipping statistics. Section II contains a Quality Assurance Summary and a table listing shipments, quality waivers and quality complaints. 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

002972

CELANESE CHEMICAL COMPANY
Chemcel Plant
Bishop, Texas

To: C. W. Harrison

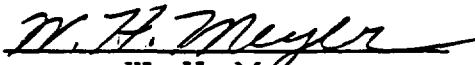
From: W. H. Meyer

WHM-24-77

March 15, 1977

Laboratory Department Summary
February, 1977

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W. H. Meyer

WHM/jm

Attached Report

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I. ANALYTICAL GROUP

Competitive Evaluations:

The Union Carbide competitive product line was evaluated this month. Samples received included n-PrOH, n-BuOH, n-PrAc, iso-BuAc, n-BuAc, n-BuH and DAA. A report detailing comparison analysis will be issued.

Polyol

TMP - The Sartomer Color Test, a benzene-sulfuric acid wash test (Gardner Units) on our TMP product will be monitored on a routine basis. This background data should aid in efforts to meet potential customer specifications.

Analytical support was provided for the preparation of 2-ethyl-1,3-propanediol, a pure compound needed in preparing our G.C. standard. The project is continuing with current efforts centered on separation and purification of the compound from T-205 overhead.

1,3-BG - Analyses were provided for a preliminary study to determine if T-227 residue product could be fed to T-218 (finishing column), and eliminate the vapor sidestream drawoff on T-227. This potential project could result in a steam saving if it is deemed applicable.

Post acetal upset and rerun of the low assay inventory, the unit (since 2-10-77) has proven its ability to consistently produce 99.5% purity. G.C. method work is complete. Current purity levels are at 99.6 - 99.7%.

MS Unit

Special analytical coverage was provided the unit on February 8, 9 and 10 for the Lurgi acceptance run. Material balance samples were analyzed.

Utilities - BOD

Chlorides (3-4 ppm) were found on February 23 in the plant demineralized water. The problem was traced to a brine solution breakthrough in the regeneration procedure. Plant and Laboratory solutions were prepared with lab-prepared distilled water until February 25, when the demineralized water lines were clear. All service is now back in demineralized water usage.

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General

Karl Fisher Water Analysis -

A search is underway to find a substitute for benzene in the formulation of the carbonyl solvent mixture. The carbonyl solvent mixture is employed as a base solution in the determination of water in carbonyl compounds. Cyclohexane appears to have good possibilities. Additional work is needed before making a recommendation.

See attached Analytical and Sample Shipping Statistics.

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Analytical and Sample Shipping Statistics

<u>Sample Count</u>	<u>February</u> <u>1977</u>	<u>Y - T - D</u>	<u>Previous</u> <u>Y - T - D</u>
Chemical Section Samples	5,046	9,506	7,655
Instrument Section Samples	<u>2,250</u>	<u>4,485</u>	<u>4,321</u>
Total	7,296	13,991	11,976

Overtime

Technician Overtime:			
Chemical	64	133	96
Instrument	<u>150</u>	<u>290</u>	<u>92</u>
Total	214	423	188

Sample Shipping

Domestic	101	214	228
Export	8	23	59
Plastics	7	17	29
Other	<u>102</u>	<u>263</u>	<u>32</u>
Total	218	517	354

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II. QUALITY ASSURANCE

Formaldehyde - A 52% formaldehyde shipment to Plastics Engineering in Celx-13234 was delayed due to a cloudy product. Reason was due to low loading temperature and low stabilizer content. The in-line blending unit continued to have numerous blend problems during the month. A total of eleven blends were missed with five of these being inhibited blends. Stabilizer content of formaldehyde inventory dropped to a low level (approximately 3-4 ppm), and in attempting to correct this problem, a high of 47 ppm was added to the blend storage. The material was blended to the normal level of 8-12 ppm.

A quality waiver was obtained from NYQA to ship one car of 50% formaldehyde on February 15, due to low assay. The customer was Chembond at Cawthon, Alabama. Assay was below minimum spec at 49.8% formaldehyde.

Paraform - Communication from NYQA reported that the decision was made to grant Asian Paints, Ltd. full credit on 900 lbs of paraform based on their complaint of colored particles in 3 drums out of a 9,000 lb shipment. A sample returned to us showed high iron content in the colored particles.

Trioxane - We continue to monitor each tank of molten trioxane (TO) for benzene. Ten (10) ppm has been set as maximum. The replacement of the TO at Van Brodie is 100% complete. Also, 60 Delkit containers at Sylvania were replaced early in January.

Pentaerythritol - PE Tech, Lot 77-12 T3 high formals (2.5%), quality waiver was obtained from New York to move this material to Newark. Hopper-trailer 4417, shipped to Lubrizol, was returned by the customer. The product was wet. The north bulk hopper was cracked and water leaked in due to heavy rains.

On February 7, Dow Chemical reported a problem with fines in pure PE, Lot 76-250 P3. The complaint is under investigation.

Methylal - During February, 62,000 gallons of methylal inventory was re-processed due to high water and aldehydes. All inventory now meets all specifications.

See attached Quality Assurance Statistics:

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Quality Assurance Statistics

	<u>February</u> <u>1977</u>	<u>Y - T - D</u>	<u>Previous</u> <u>Y - T - D</u>
Shipments (Number of Orders)	830	1,673	1,304
Delayed Shipments	1	5	7
Quality Waivers	2	4	3
Quality Complaints	4	8	3
Quality Complaints Accepted	2(1,2)	3	3

(1) PE Pure - Lubrizol bulk shipment - high water.

(2) Paraform Flake - Asian Paints, Ltd. - Colored flakes - high iron.

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III. SPECIAL PROBLEMS GROUP

Methanol Oxidation, Formaldehyde Blending
A. J. Branecky

MO Efficiency Improvement with

Trace Amounts of Halogenated Hydrocarbons - Preparations are nearing completion for plant testing of methylene bromide in MO-III. Actual injection is planned for the week of March 14.

MO New Catalyst Screening - A new sample of silver "melt extracted fiber" has been obtained for evaluation. An initial sample was found unacceptable. A sample of silver "Feltmetal", a material similar to "Foametol" is being obtained for evaluation.

MO Catalyst Reuse - Plant testing of used MO-IV catalyst that has been washed with demineralized water continues. The first data point indicates catalyst life in MO-IV can be increased twofold. A status report will be issued.

MS-II Crude to MO - The first stage of the project is essentially complete. Crude methanol after filtering through a 1 μ filter was fed to the MO micro unit for approximately 40 hours averaging 89.1% efficiency. Standard methanol fed before and after feeding the crude averaged 89.2%. A report will be issued recommending a plant trial.

Water Injection to MO - A single reactor in MO-III is being utilized in studying the effects of feeding water to the MO reactor. Essentially the same trends seen in the plant trial in MO-IV and in micro unit studies are being observed. Feeding water results in an increase in CO₂ make and a decrease in CO and H₂ make, the overall effect being constant efficiency. Significant reactor temperature decreases are observed when feeding water (not consistently seen in MO-IV plant trial). Studies will continue until a thorough understanding of the apparent equilibrium shifts is gained. At that time, the plant trial in MO-IV will be resumed.

Pentaerythritol, Weak Formaldehyde
H. H. Thigpen

PE Efficiency - The laboratory study of the effect of "A" evaporator gravity and "A" crystallizer drop temperature was completed. Efficiency increases of 2-4% appear to be obtainable with better control of these variables.

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Additional data show that the viscosity of the filtrate (AML) increases sharply at lower crystallizer temperatures and higher sodium formate plus organics content. High viscosity of AML can cause problems with the filtration. Fortunately, maximum efficiencies can be obtained at conditions which avoid the high viscosity situations.

The final step in the current lab study is to determine the best way to monitor the unit to allow operations to maximize efficiency and avoid filtration problems (high viscosity). All data will be published with recommendations when this final step is complete.

A laboratory study of the PE linear formal hydrolysis step was begun. The objective is to develop a way to minimize the cyclic formal production. The cyclic formal is not only a direct efficiency loss, but appears to increase the solubility of PE in AML to cause additional efficiency losses.

The economic potential of minimizing cyclic formal formation may be equivalent to an additional 5-8% efficiency during pure PE production, and 2-3% during tech PE production.

PE Unit Support - No lab studies required this month.

Lower Sulfate in PE AML - No lab work. Another plant test of higher digester temperature will be scheduled after the carbon bed is installed (installation should be complete by May 1, 1977). An earlier plant test was successful, but might have caused an increase in PE color.

PE Fines - There have been several recent complaints of "fines" in our pure PE. "Fines" is defined as the per cent of a 100 gram sample which passes through a 200 mesh screen in our standard screen analysis. Data indicate that our pure PE bulk shipments have a relatively large amount (about 5%) of fines. Questionable data indicates that bag shipments contain <1% fines, but the actual amount may be in the 1-3% range. A report, (HHT-05-77) has been issued which outlines what has been done to date, to control fines and additional actions which can be taken, if justified.

PE Unit Daily Carbon Accountability - A report which outlines required procedures and identifies additional equipment needed is complete and in typing.

Methanol Synthesis

F. R. Dow

Fuel Gas Quality - Comparison of February, 1977 fuel gas analyses with February, 1976 analyses shows that the quality has remained unchanged.

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The BTU value (dry basis) was 1040 (February, 1976) and 1037 (February, 1977).

MS-II Analytical Support - Laboratory support for the Lurgi catalyst acceptance run was provided by the Chemcel Laboratory and Mr. Bobby Jarrett (CCCTC).

Samples were obtained and analyzed for material balances from the converter loop on February 8, 9 and 10, 1977. The analyses were used to calculate yields and efficiencies of the Lurgi catalyst. Crude methanol contained 0.4 - 0.5 wt. % DME, and approximately 110 ppm EtOH.

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

Methylal Build in Methyl Formcel - The study to determine if aluminum 6061-T6 for methyl Formcel storage causes increased methylal formation continues. Methyl Formcel samples containing Al 6061-T6 and Al_2O_3 have shown no significant methylal increase after approximately 4 weeks.

Paraform Material Balance - Progress on this project is delayed due to the current lack of Process Engineering coverage on paraform.

Ester Unit Support - A possible method for determining cupric and cuprous ions in the acetate reactor kettle is being investigated. This is in support of the planned addition of cupric phosphate to the reactor kettle as a corrosion inhibitor. Necessary reagents have been ordered and the method will be evaluated upon arrival of the reagents.

Alternate n-Butyl Acetate Process - Additional data is being collected around the reactor column. Reactor column product is being collected for a purification run. An alternate purification scheme is under consideration.

Paraform, Formals and Ester Unit Analytical Manuals - Work is underway to update the acetate unit analytical methods.

Oxo, 1-Butanol, 1-Propanol
A. J. Bacon

Oxo Reactor Accountability/Operational Problems - No progress was made in identifying unknowns.

Foaming problems began to occur in late January and early February that required increased laboratory attention. Apparently, the catalyst solution

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was allowed to rise and heavy ends built to the point where stripping (and rates) had to be cut to avoid catalyst carry-over. Phosphorus level was found to be low, implying that the heavy ends were butyraldehyde-related.

Several hundred gallons of catalyst were taken to the dump vessel to lower the reactor level and allow increased stripping of heavy ends. This material is being worked back in slowly.

Rhodium usage has apparently been low; no rhodium has been added since late January. Throughout this month, both TPP and rhodium concentrations in T-210 residue have remained normal at approximately 1% and 2 ppm, respectively.

Leads on the foaming problem will be followed up the first week of March.

T-229 Residue Aldol - Very fine solids in T-210 residue were isolated for analysis. These solids give the stream a hazy appearance which takes days to settle out. Analysis of the material showed a large amount of Ca, Cl and S. The source of this solid was traced back to T-281 overhead, where approximately 150 ppm Ca and approximately 300 ppm Cl were found in the water layer. Apparently there is a cooling water leak in a heat exchanger. The effect of this solid on aldoling will be investigated in the Lab.

T-210 Residue Burning - A second test of the feasibility of burning T-210 residue in No. 1 boiler is underway after modifications were made. TPP levels remain normal.

Oxo, 1-Butanol, 1-Propanol Unit Support - a) Dialogue with Matthey-Bishop on rhodium nitrate quality was begun. They have doubts as to their ability to meet our acid spec.

b) Clear Lake propylene quality checks are continuing.

c) T-133 overhead analyses were carried out by the wet and instrument labs as part of the butanol steam savings project. Assays were OK, but sulfuric acid color was 200-300 (old internal spec is <5).

d) Possible costly consequences were avoided when a steam hood used in perchloric acid digestions was dismantled by Maintenance and thoroughly cleaned when it was realized that the hood was not certified for perchlorates in the vent duct. After the cleaning, no perchlorates were found. The apparatus was reassembled and will not be used for perchloric acid without modification.

Trimethylolpropane
D. W. Harris

TMP Unit Support - Several unsuccessful reaction and purification schemes were attempted to obtain 2-ethyl-1,3-propanediol suitable for an analytical standard. Work continues.

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A possible problem with analysis for iron in sodium formate has been identified. Work will be conducted as time permits.

A report recommending repiping of the sodium formate concentrator overhead from the polyol solar sump to BOD has been issued (DWH-05-77).

TMP Unit Analytical Manual - Work continues as time permits.

TMP Daily Carbon Accountability - Complete letter in typing.

Increased Formaldehyde Feed

Concentration to the TMP Reactor - The plant trial will be held in abeyance until rates are reduced.

Sartomer Color Problem - The potential exists to sell 1 MM lbs TMP per year to the Sartomer Company if we can meet their benzene-H₂SO₄ wash color spec of 10 Gardner Units max. Laboratory work has begun to determine the most economical means to improve the "Sartomer Color" of our TMP and is summarized below:

1. Color bodies are formed in both the TMP unit "front ends" and purification systems (T-205).
2. The finishing column contains both light and heavy end color bodies.
3. Mr. R. Cuevas, CCCTC, has identified 2-ethyl propenal and 2-ethyl-3-hydroxy propanal in the finishing column overhead by GC/MS techniques.
4. "Sartomer Color" of Chemcel TMP is typically 10-14 Gardner Units.
5. A sample of TMP "Sartomer Color" 7, has been shipped from Sartomer for comparative analysis and our evaluation.
6. Several potential schemes to improve the "Sartomer Color" of our TMP have been identified and will be tested this month.
7. A lot sample of TMP ("Sartomer Color" 15) has been extracted with benzene. The extract has been sent to Mr. R. Cuevas, CCCTC, for GC/MS analysis.

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1, 3 - Butylene Glycol
J. W. Hermann

1,3-BG Daily Carbon Accountability - A report on the results of a plant trial and estimated cost for implementation is in preparation.

1,3-BG Efficiency - No work due to priority given to unit support.

1,3-BG Unit Analytical Manual - No work due to priority given to unit support.

1,3-BG Unit Support - The 1,3-BG hydrogenation system was monitored closely during February. The hydrogenation product was analyzed daily by Special Problems. The cyclic acetal of 1,3-BG and acetaldo1, which was the cause of the purity problems during January, was found in very low levels. The unit was able to maintain these low levels by maintaining an adequate hydrogenation catalyst concentration and by closely monitoring the hydrogenation temperatures. A report summarizing the process problem is in preparation.

The methods which are used by yield accounting were explored and a letter concerning possible improvements of the system has been prepared. A letter concerning measurement of the temperature of the acetaldehyde inventory tanks was also prepared.

Utilities, Raw Materials, BOD
M. F. Brady

Purchase Specifications Update - No progress due to priorities.

Demineralizer Support - Capacity problems were brought to the attention of the Laboratory. Laboratory investigation determined part of the problem was due to high chlorides in the demineralizer feed water. The high chlorides came from the water treating unit zeolite beds. The zeolite beds were not thoroughly rinsed after regeneration with brine. It was recommended that the zeolite beds be rinsed until the chloride content out of the zeolite is the same as in the feed. A report will be issued. Work continues on capacity problems.

Utilities Support - The BOD unit was monitored by the Laboratory for trioxane in the feed and outfall. Laboratory analyses indicate that trioxane, a semi-refractory material, is partially passing through the BOD unit and is making up a large portion of the outfall COD level. Work is continuing to follow trioxane in the BOD system.

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Boiler No. 11 was tested by the Laboratory for complete combustion. A yellow flame indicated poor combustion. Laboratory investigation showed that sodium caused the flame to be yellow. Work continues to find the source of sodium. Laboratory analysis of boiler No. 11 stock gas showed only trace amounts of CO and CH₄, indicating complete combustion. A report will be issued.

Identification of All Plant Waste Streams - The Laboratory assisted Process Engineering and Operations in the survey of liquid waste streams for the paraform and MS units. This survey is to identify all plant waste streams and their ultimate point of disposal.

Waste Heat Recovery of T-205 Overhead - The Laboratory determined the specific gravity and water content of T-205 overhead. Further work is delayed due to priorities.

Evaluation of Rohm and Haas
IRA-94 for Formaldehyde Service - No progress due to priorities.

BOD Unit Analytical Methods Manual - Manual returned for further revisions of methods. Work continues.

Anaerobic Pilot Testing of Chemcel Waste Streams - Sampling continues. The CCCTC Anaerobic Pilot unit continues to operate smoothly with good COD removal efficiency. The aerobic polisher has acclimated to the anaerobic outfall. Aerobic outfall COD's are less than 100 giving an overall removal efficiency of 99%.

Addition of Betz Neutraneen
To the Plant Steam System - The Laboratory has set up calibration curves for amine levels in the condensate. The program will get underway as soon as sample coolers are installed.

OSHA Monitoring
J. M. Jackson

Paraform - A personnel (8-hour TWA) and area sample for formaldehyde was taken in the paraform unit. The 8-hour TWA was obtained on the operator helper. The area sample was taken between the two flaker drums.

Polyol-TMP - Spot samples for formaldehyde were taken during unusual conditions in the TMP unit. T-206 column was pressured and was venting to the atmosphere due to the switching of cooling towers. Samples were taken as follows:

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1. Polyol control room door, east entrance.
2. Sidewalk near V-747.
3. Sidewalk near TMP melt tank.

Polyol, PE and 1,3-BG - Personal 8-hour TWA samples were taken of acetaldehyde in work area atmosphere. The person with the highest potential exposure to acetaldehyde was checked:

1. 1,3-BG - Operator
2. PE - Guager

The Chemical Company Industrial Hygienist, Mr. Dave Barrett, made a tour of the Chemcel location during February. An effort to introduce him to Chemical and Plastics Company management personnel was made.

Diacetone Alcohol
A. E. Retherford

DAA Unit Support - No serious process problems were experienced in the DAA unit during February. During the DAA shutdown, V-1268 (spec DAA inventory tank) was found to be high in water content (approximately .15 wt. % versus .10 wt. % specification). The high water was probably due to the moisture in the air blanket on the vessel. The high water DAA material was blended down with fresh DAA production as soon as the unit was back on stream.

DAA Gas Chromatograph

SMA Analytical Method - Assistance was given the Analytical Group in evaluating the present SMA G.C. method for DAA. A new G.C. method is being considered with hope of achieving better DAA analysis. Work will continue as requested.

DAA Laboratory Reactor Study - Work has begun on a laboratory DAA reactor. The reactor is a scaled-down version of the unit reactors and will be used to evaluate possible new DAA catalysts. Possible catalysts include ion-exchange resin and a catalyst supplied by a vendor. The purpose of the work is to obtain higher DAA conversion thereby increasing unit capacity and saving steam.

DAA Reactor Temperature and Residence Time Study - The plant trial has been delayed due to low DAA inventories. The study requires that the recycle rate of the plant reactor be reduced to 45 gpm (approximately 1/2 design rate) through one reactor so that sufficient cooling can be obtained. The study will be completed when DAA inventories permit.

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Miscellaneous

1. C. E. Bull and J. H. Harris attended the PMA one-day seminar, "Management by Objectives".
2. A. G. McGehee attended the PMA seminar, "Successful Middle Management"
3. W. H. Meyer attended the "Engineering Project Investment Analysis" course at Texas University on February 28 through March 2.
4. M. F. Brady attended the University of Texas course "Advanced Water Pollution Control: Biological Waste Treatment" on February 28 through March 4.

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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 May 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	March 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	August, 1977
PE Unit Support		1	Maintenance of Business	Continuing
Lower Sulfate in PE AML		2	Comply With Virginia Chemical Co. Request	July 1, 1977
PE Fines		1	Maintenance of Business	July 1, 1977
PE Unit Daily Carbon Accountability	↘	1	Raw Material Savings	April 1, 1977
Fuel Gas Quality	Dow	1	Improve Plant Fuel Gas Accountability	April 1, 1977

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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
Methylal Build in Methyl Formcel	Hilbrich	2	To Determine Methylal Storage Stability in Aluminum	September 1, 1977
Paraform Material Balance		2	Possible Raw Material Savings	September 1, 1977
Ester Unit Support		1	Maintenance of Business	Continuing
Alternate n-BuAc Process		1	Steam Savings	July 1, 1977
Paraform, Formcels, Ester Unit Analytical Manuals	↘	2	Maintenance of Business	July 1, 1977
Oxo Reactor Accountability	Bacon	2	Improved Reactor Control and Analytical Balance	Unknown - Work as Time Permits
ProOH Material Balance		1	Raw Material Savings	April 1, 1977
T-229 Residue Aldol		2	Raw Material and Possible Steam Savings	June 1, 1977
T-210 Residue Burning		1	>\$100M Fuel Value	Work as Requested By Engineering
Oxo, BuOH, ProOH Unit Support	↘	1	Maintenance of Business	Continuing

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Current Special Problems Projects

Project	Chemist	Priority	Justification	Estimated Completion Date
Sartomer Color Problem	Harris	1	Increased TMP Sales (Potential IMM lbs/yr)	June 1, 1977
TMP Unit Analytical Manual		2	Maintenance of Business	September 1, 1977
Increased Formaldehyde Feed Concentration to the TMP Reactor		1	Steam Savings	June 1, 1977
TMP Daily Carbon Accountability		2	Possible Raw Material Savings	Complete
TMP Unit Support		1	Maintenance of Business	Continuing
T-206 and V-759 Vent Emissions	✓	2	To Ensure TACB Compliance	Unknown - Work Pending Piping Modifications
1, 3-BG Daily Carbon Accountability	Hermann	2	Possible Raw Material Savings	April 1, 1977
1, 3-BG Efficiency		1	Raw Material Savings	June 1, 1977
1, 3-BG Unit Analytical Manual		1	Maintenance of Business	May 1, 1977
1, 3-BG Unit Support	✓	1	Maintenance of Business	Continuing
Purchase Specifications Update	Brady	1	Maintenance of Business	April 15, 1977

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Current Special Problems Projects

Project	Chemist	Priority	Justification	Estimated Completion Date
Demineralizer Support	Brady	1	Maintenance of Business	Continuing
Utilities Support		1	Maintenance of Business	Continuing
Evaluation of Rohm and Haas IRA-94 for Formaldehyde Service		2	Resin Cost Savings	August 1, 1977
BOD Analytical Methods Manual		2	Maintenance of Business	May 1, 1977
Anaerobic Pilot Testing of Chemcel Waste Streams		1	To Test Anaerobic Process as Alternate BOD Expansion	May 1, 1977
Addition of Betz Neutraleen to The Plant Steam System		1	Reduce Steam System Corrosion	August 1, 1977
Waste Heat Recovery of T-205 Overhead		2	Energy Savings	June 1, 1977
Identification of All Waste Streams	↓	1	WTTTF Objective	December 31, 1977
OSHA Monitoring	Jackson	1	Ensure Employee Health and Safety - OSHA Compliance	Continuing
DAA Unit Support	Retherford	1	Maintenance of Business	Continuing
DAA Reactor Temperature and Residence Time Study	↓	1	Increase Unit Capacity and Steam Savings	August 15, 1977

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Current Special Problems Projects

[illegible]

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