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INCORPORATED
WILMINGTON, DELAWARE 19898

CHEMICALS AND PIGMENTS DEPARTMENT

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July 28, 1983

DU PONT CONFIDENTIAL -
SPECIAL CONTROL

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1984 TECHNOLOGY SUMMARY
COLORED PIGMENTS

Attached for your processing is a draft of our
1984 Technology Summary for Colored Pigments.

R. S. Weis
R. S. WEIS

RSW:ph

Attachment

N 26967

1984 TECHNOLOGY SUMMARY

COLORED PIGMENTS

BUSINESS MISSION

Manage quinacridone in a strengthen mode and "Krolor" in a sustain mode, while managing remaining products in a harvest mode. Improve cash flow by reducing costs and maintain an assured supply of quality pigment to F&FP.

ROLE OF TECHNOLOGY

Superior quinacridone process and product technology is the key factor in maintaining Du Pont's competitive leadership in quinacridones. The quinacridone segment is Du Pont's strength in Colored Pigments.

EVALUATION

	Technology Position Opposite Competition			Summary
	1983	1988	1993	
Product				
Quinacridone	+	+	+	Superior products for automotive finishes and plastics.
Inorganics	+	+	0	Conventional inorganics competitive in all areas. "Krolor" superior for plastics applications.
Copper Phthalocyanine	0	0	0	CPC blues are generally equal to competition.
Other Organics	0	0	0	Competitive products for ink and consumer paints, but product line is narrower than competition's.
Process	0	0	0	Low cost producer of quinacridone crude. Some copper phthalocyanine and other organic processes are not cost competitive.

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TECHNOLOGY ASSESSMENT

COMPETITIVE TECHNOLOGY POSITION

PATENT POSITION

Du Pont's current competitive advantage in the quinacridone business is a direct result of past strong patent position on process and product technology.

Critical quinacridone patents on crude synthesis and solid solution products have expired in the last several years, allowing competition, especially Bayer, to introduce products that had been unique to Du Pont. Patent protection continues through the late 1980's on important treating agents and quinacridone gold products. No strong patent protection exists for other product lines with the exception of silica coated lead chromates ("Krolor") where product and process patent protection exists through the mid-80's. Competition is marketing "Krolor"-type products, which we feel infringe our basic patents.

KEY TECHNOLOGIES

Quinacridone

- Crude Synthesis
- Finishing Technology
- Product Properties

		Business Impact	Life Cycle	Du Pont	Hoechst	Bayer	Sun						
MI	M	▲											
MO	M	△	▲	▲	▲	▲							
MO	M	▲											

LEGEND

Life Cycle

E = Emerging
EV = Evolving
M = Mature

Business Impact

MA = Major
PMA = Potentially Major
MO = Moderate
MI = Minor

▲ Competitive Position
Major Present Advantage

▲ Modest Present Advantage

△ Major Future Advantage

△ Modest Future Advantage

(Continued)

TECHNOLOGY ASSESSMENT

COMPETITIVE TECHNICAL ACTIVITY

STATE OF THE ART

Research in Colored Pigments at Du Pont and major competition is generally aimed at modifying and improving existing products to meet the performance needs of changing end-use industries. European pigments manufacturers have also been successful in research aimed at developing completely new pigment chemical types (as judged by patent activity) especially in the yellow, orange, and red color areas. Du Pont currently does not have a major technical effort aimed at new pigment development.

COMPETITOR'S ACTIVITY

DU PONT IMPACT

- | | |
|---|--|
| <ul style="list-style-type: none">o Bayer has developed a production unit (Bushey Park, S.C.) utilizing Du Pont quinacridone synthesis technology to produce unique red products.o Bayer and Sun are actively developing quinacridone solid solution products which had previously been unique to Du Pont. | <ul style="list-style-type: none">o Du Pont production scale should continue to yield better economics.o Du Pont technical expertise in quinacridone product development and strong ties with F&FP will maintain our lead in new product development. |
|---|--|

CONCLUSION

Du Pont's strength in Colored Pigments resides in the quinacridone segment of the business. Our large scale production facility based on intermediate synthesis of dihydroquinacridone and our backward integration to dimethylsuccinate (a Petrochemicals Department by-product) combine to make us the low cost producer of crude quinacridone. The requirement for high temperature operation and sophisticated solvent recovery make it difficult for competitors to duplicate our economics without significant investment. Bayer has installed a production facility based on our technology to produce products formerly unique to Du Pont.

Improved product introductions are key to maintaining a competitive advantage. Our technical expertise in quinacridone product development and our close ties to the critical automotive industry through F&FP should allow us to continue our product superiority.

Du Pont is generally equal to competition in product technology in non-quinacridone segments of the business. However, our multiplant configuration and low capacity utilization result in process cost disadvantages in these segments vs. competition.

RESEARCH STRATEGY AND PROGRAMS

STRATEGY

Research emphasis will be placed on maintenance of our quinacridone competitive position through improved product development to respond to new automotive finishes technology and to expand quinacridone penetration into high value plastics markets. Development of improved products in non-quinacridone business segments will be minimized over the next several years.

Manufacturing technical programs are aimed at upgrading existing product technology to improve operating reliability and product quality and reproducibility. Success in these programs will allow future operation of the Colored Pigments business in a more cost effective manner to improve profitability and competitive position.

PROGRAMS

Tactical Research	1983 Expenditures		1984 Expenditures		Incentive
	MP*	\$M	MP*	\$M	
o Develop new, improved QA products to meet changing automotive end-use technology and maintain our competitive position.	4.0	1250	4.7	1220	o 1.3MM lbs. new business during 1985-1988 resulting in a profit contribution of \$18MM. o Protection of our QA competitive position.
o Develop new non-QA product forms that improve value-in-use in critical paint and plastics applications.	2.5	810	1.7	550	o 800M lbs. new business during 1985-1988 resulting in a profit contribution of \$1.2MM.
o Improve operating technology and facilities to reduce cost and allow more reliable operation of manufacturing processes.	3.8	840	4.9	920	o \$1.4MM in 1984 cost reduction. o Allows operation of Colored Pigments business at zero base levels.

*Direct manpower only.

RESEARCH STRATEGY AND PROGRAMS (1984) (Continued)

KEY ISSUES

- o Can we be successful in process improvement program to achieve cost reduction goals of Colored Pigments business?
- o Will we successfully maintain our quinacridone competitive position through new product development programs.

SUMMARY DATA

	1983(E)		1984(F)	
	Manpower*	\$MM	Manpower*	\$MM
R&D	17	2.9	14	2.7
MT	9	1.6	8	1.4
Total	26	4.5	22	4.1
R&D & S&T		2.7		2.3
Total & S&T		4.2		3.5

*Direct plus allocated manpower without ESD personnel.

RESEARCH OBJECTIVES (%)

	1982(A)	1983(E)	1984(F)
Cost Reduction			
Existing Process	17	29	34
New Process	-	-	-
Capacity	-	-	-
Existing Product Improvement	72	71	66
New Products	11	-	-
Regulation	-	-	-

TABLE I

EXPENSE AND MANPOWER

BUSINESS NAME: COLORED PIGMENTS

	ACTUAL					FORECAST				
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Res. & Dev.*										
- Expense, \$M	5500	3810	4660	4620	2660	2910	2690	2920	3090	3290
- Exempt MP (1/1)	31	29	30	38	22	21	14	14	14	14
Manufact. Tech.										
- Expense, \$M	1400	1845	2210	2145	3160	1570	1435	1500	1580	1655
- Exempt MP (1/1)	20	20	20	21	26	9	8	8	8	8
Sales Technical										
- Expense, \$M		1153	1392	2506	1998	1511	1588	1667	1750	1838
- Exempt MP (1/1)		12	14	22	18	11	10	10	10	10

Distribution of R&D Objectives

Cost Reduction										
- Existing Process	43	53	53	34	17	29	34	34	34	34
- New Process										
Capacity										
	4	0	0	0	0	0	0	0	0	0
Existing Product Improvement										
	35	30	37	39	72	71	66	66	66	66
New Products										
	7	16	10	27	11	0	0	0	0	0
Regulation										
	11	1	0	0	0	0	0	0	0	0

* R&D includes MDV

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7/25/83

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