RESEARCH SUMMARY

COLORED PIGMENTS

BUSINESS SUMMARY

MISSION

- The mission is to consolidate our position, improve profitability and generate cash.

KEY ISSUES

- Will our CPC strategy to focus on specialty products be successful?
- Will we be able to defend our QA position and profitability as patents expire?
- How will regulations on lead and chromium impact us?
- Can European marketing plan be implemented successfully?
- Will new product development succeed?
- How viable is our future capability for intermediates manufacture of new organic pigments?

STATISTICS

	S&T		PTE	TI	PROI
	MM Lbs.	($MM)	($MM)	($MM)	(%)
1980	32	109	(8)	132	(6)
1985 Forecast	41	200	31	200	16
Growth/Year, (1980-85)	5%	13%	-	9%	

PROCESS DESCRIPTION

Quinacridone (QA) is produced in a four-step process starting with dimethylsuccinate (a Petrochemicals Department by-product). Dimethylsuccinate (DMS) is condensed to form succinyl succinic ester (Step 1), reacted with aniline to form a dianilinodihydroterephthalic acid ester (Step 2), thermally ring closed to form dihydroquinacridone (Step 3), and finally oxidized with a sulfonated nitrobenzene to form quinacridone (Step 4). The low yield (80%) of the DMS condensation and the cost/availability of the Step 4 oxidizing agent are areas of potential process improvement and cost reduction. Most of Du Pont's proprietary process protection has expired, but because of good raw material cost position and large scale operation we expect to maintain our low cost QA producer status.

Lead chromate pigments are manufactured by reaction of lead nitrate with sodium dichromate or dichromate/molybdate mixtures. Coating chromate pigments with silica in an additional process step yields our Krolor® product line. Our continuous manufacturing unit gives us a slight cost advantage over competition, but the entire chromate business is clouded by pending environmental regulations on lead dust and chromium effluent. Krolor® technology is proprietary.

Copper phthalocyanine (CPC)blue is synthesized by reaction of phthalic anhydride and urea in the presence of a molybdenum catalyst. CPC greens are produced by chlorination or bromination of blue. Our CPC processes are not unique and the business suffers from capacity under utilization and some high cost finishing processes.

Azo products are generally produced by coupling of diazotized amines to acetoacetarylides or β-naphthol derivatives. Reaction of certain azos with metal ions forms our "Watchung" product line. Du Pont technology is not unique.

PRODUCT DESCRIPTION

Du Pont's quinacridone product line is broad in color (violet to gold), and based on unique combinations of unsubstituted and substituted quinacridones. Quinacridones find their major use in automotive paints and plastics due to their superior durability and heat stability. Du Pont's product line broader than competition with unique solid solution products and competitive conventional products. Du Pont proprietary position on some solid solutions will expire in 1981 but gold products will continue to be protected through the late 1980's.

Conventional inorganics are competitive and geared mainly for the ink and industrial paint markets. Krolor® is a unique heat resistant product used in the plastics industry. Patent protection exists into the mid-1980's, but competition is marketing similar products, which we feel infringe our proprietary position.

Copper phthalocyanine blues and greens are used in all pigment consuming industries because of their excellent durability and color strength. The quality of Du Pont's CPC line is generally equal to competition. We have many high value products that command premium prices. Our green line is deficient in performance to competition.

Azo products (other organics) are used primarily to consumer paints and inks because of their good balance between cost and color properties. Du Pont products are not unique and are generally equal in performance characteristics to competition. No general patent protection exists.

Cost effective methods to meet lead chromate regulatory requirements will be explored, including development of new low dust product forms and packaging to allow continued participation in the profitable Krolor® business and selected conventional inorganics. Process improvements will be sought to improve our competitive cost position in CPC blue pigments.

1981 Programs

Strategic Research	Expenditure Manpower	Expenditure $M	Incentive Pretax Earnings
• Development of new environmentally acceptable, proprietary yellow-red pigments for paints and plastics (with CR&D) to significantly strengthen our competitive position in these color and end use areas.	4.0	1,080	$3.5MM (1985)
Tactical Reesearch			
• Develop new and improved QA products to meet changing automotive end use technology and maintain our competitive position.	2.9	790	$1.5MM (1985) new business & protect $4MM existing business.
• Develop new pigment product forms that improve value-in-use and reduce dust properties.	2.0	540	$1.5MM (1985)
• Reduce CPC blue costs by developing a new finishing operation.	1.0	270	$0.35MM (1985).
Manufacturing Technical			
• Consolidate CPC blue semi-finishing operations, reduce raw material costs and increase yields.	3.7	600	$9.8MM (1981)
• Reduce investment required to meet environmental regulations on lead to chromium.	2.0	410	Reduce investment to acceptable levels.

STATISTICAL INFORMATION

R&D Budget

	1980(E)	1981(F)
$MM	3.4	3.8*
Manpower	17.0	15.0

*CR&D funds an additional $1.6MM.