

UNION CARBIDE CORPORATION
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ECONOMIC EVALUATION
OF THE
ACQUISITION OF PECHINEY-ST. GOBAIN PROCESS
PVC RESIN PLANT FROM DOW CHEMICAL COMPANY

By

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SOUTH CHARLESTON
WEST VIRGINIA

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ECONOMIC EVALUATION
OF THE
ACQUISITION OF PECHINEY-ST. GOBAIN PROCESS
PVC RESIN PLANT FROM DOW CHEMICAL COMPANY

INTRODUCTION

Economic calculations were made to evaluate the possible acquisition of a PVC resin plant being offered for sale by Dow Chemical Company. The plant is in the final stages of construction on a corner of Dow's Plaquemine, Louisiana plant site. It was built under a license from Pechiney-St. Gobain (P-S-G) to use the company's improved bulk polymerization process. P-S-G guarantees a plant capacity of 34 million pounds per year of PVC resin. Dow has made changes they expect will increase capacity to 42 million pounds per year. Dow's asking price for the initial plant is \$5.575 million. They estimate the capacity can be doubled for an additional \$2.5 million. The plant layout will accommodate an expansion to quadruple the present capacity.

The four cases investigated were:

- (1) Standard UCC-type pro forma O & R, normal sales of all products.
- (2) Make vs. buy economics for Fibers & Fabrics Division resin requirements.
- (3) Financing by a large volume customer (e.g., Ford).
- (4) Installment financing from Dow.

The results and sample calculations are presented on the following pages. A description of each case lists the basis of calculations.

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CONCLUSION

At predicted PVC resin sales prices, the acquisition of the P-S-G plant is not an attractive venture. This is demonstrated by examining each case at the maximum predicted plant capacity and at the maximum predicted average resin sales price of 11.5 cents per pound.

- Case 1: Standard O & R. (See Figures 1 and 2.) At a purchase price of \$1.5 million less than Dow's asking price, (GFI = \$4.5 million before expansion) UCC receives 9% ROI. After expansion, UCC receives 12% ROI.
- Case 2: Resin for Fibers & Fabrics Division, Make vs. Buy. (See Page 7.) At a purchase price of \$1.5 million less than Dow's asking price, (GFI = \$4.5 million) UCC receives an ROI of 11%.
- Case 3: Customer financing. (See Figures 3 and 4.) An arrangement which would give Ford a 12% DCF return (4 ¢/lb price reduction, \$5.5 million invested by Ford) would give UCC a 15% DCF return. This is a moderately attractive return for both companies but it is unlikely Ford can be committed to a long-term (15-year) purchase contract or that UCC can count on long-term price stability of resin at 11.5 cents per pound.
- Case 4: Dow financing. (See Figures 5 and 6.) A leasing arrangement which would give Dow a 4% ROI (\$650,000 annual lease fee) would give UCC a 4% ROI.

BASES OF CALCULATIONS, RESULTS, AND SAMPLE CALCULATIONS

Case 1 - Return on Investment vs. Sales Price on the following basis:

Buy plant from Dow for direct sales of resin. First 25 million pounds per year sold to large-volume customers at overhead = 6 percent of net income from sales (NIFS), distribution in hopper cars at 1.65 cents per pound.

Balance of production to small volume customers at overhead = 13 percent NIFS, distribution in bags at 2.74 cents per pound.

Four values of plant capacity (34, 42, 68, and 84 million pounds per year) and several values of GFI were investigated.

Direct and period costs based on data supplied by Dow are shown in Table 1.

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TABLE 1

		Plant Cost, M\$ At Indicated Plant Capacity			
	<u>¢/Lb of Product</u>	<u>34 MM Lb/Yr</u>	<u>42 MM Lb/Yr</u>	<u>68 MM Lb/Yr</u>	<u>84 MM Lb/Yr</u>
<u>Direct Cost</u>					
Vinyl chloride monomer, 1.05 #/ # Product x 2.9 ¢/ #	3.045	1,035	1,279	2,070	2,558
Catalyst & Chemicals	0.250	85	105	170	210
Steam, 0.44 #/ # Prod. x 85 ¢/M#	0.037	13	16	26	32
Nitrogen, 0.144 cu ft/ # Prod. x 0.28 ¢/cu ft	0.041	14	17	28	34
City water, 0.033 gal/ # Prod. x 0.1 ¢/gal	0.003	1	1	2	2
Elect. Power, 0.4 KWH/ # Prod. x 1.2 ¢/KWH	0.480	<u>163</u>	<u>201</u>	<u>326</u>	<u>402</u>
TOTAL DIRECT COST		1,311	1,620	2,621	3,339
<u>Period Cost</u>					
Contract maintenance		300	300	425	425
Insurance		15	15	20	20
Misc. Dow services					
Emergency fire protection & ambulance		25	25	30	30
Coolant water disposal		25	25	30	30
Manpower					
Shift people @ 44 M\$/yr/position ⁽¹⁾		220	220	264	264
Contract people including supervision ⁽²⁾		115	115	170	170
Supervisory & technical - 5 @ 10 M\$/yr		50	50	50	50
Misc. operating supplies		<u>20</u>	<u>20</u>	<u>25</u>	<u>25</u>
TOTAL PERIOD COST		770	770	1,014	1,014

- (1) Five shift positions for Single-Train Plant - 6 for Two-Train Plant.
(2) Eleven contract people for Single-Train Plant, 16 for Two-Train Plant.

Royalty Payments to P-S-G Based on -

5% of NIFS on First \$4,000,000 Sales and Usage
3% of NIFS on Next \$6,000,000 Sales and Usage
2% of NIFS on Sales and Usage over \$10,000,000

Working Capital = 12% of Total Operating Cost + 14% of NIFS
+ 25% of Total Product Cost

Gross Fixed Investment = Plant purchase price + \$500,000 for misc. changes before operation, purchase of hopper cars, and other non-plant investment.

Depreciation = 8% of Gross Fixed Investment

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Sample Calculation for Case 1

(M\$ Except Where Noted)

Gross Production, M Lbs	42,000
Sales price, ¢/lb	11.5
Net Sales Value	4,830
Direct Cost	1,620
Period Cost	770
Royalty Payments	<u>180</u>
Total Plant Cost	2,570
Distribution for:	
First 25 MM lbs = $\$0.0165 \times 25 \text{ MM} =$	410
Balance = $\$0.0274 \times 17 \text{ MM} =$	460
Overhead,	
First 25 MM lbs = $(0.06) \times (\$0.115) \times (25 \text{ MM}) =$	170
Balance = $(0.13) \times (\$0.115) \times (17 \text{ MM}) =$	<u>250</u>
Total Operating Cost	3,860
Operating Income	970
Depreciation (8% of GFI)	500
ROI Income	470
New Fixed Investment	4,500
Working Capital	
Cash: $0.12 \times \text{Total Oper. Cost}$	460
Acct. Rec.: $0.14 \times \text{Net Sales Value}$	670
Inventory: $0.25 \times \text{Plant Cost}$	<u>640</u>
Total Investment	6,270
ROI = $(470)/(6270) =$	<u>8%</u>

Figure 1 shows percent ROI vs. resin sales price at four plant capacities.

Figure 2 shows percent ROI vs. gross fixed investment (GFI) at various values of resin sales price for a 42-million-pound-per-year plant.

ROI vs Resin Sales Price
at Various Plant Capacities

GFI @ 34 & 42 MM lb/yr = \$4.5 MM
GFI @ 68 & 84 MM lb/yr = \$7.0 MM
25 MM lb/yr @ 6% Overhead; Bulk Distribution
Balance @ 13% Overhead; Distribution in Bags

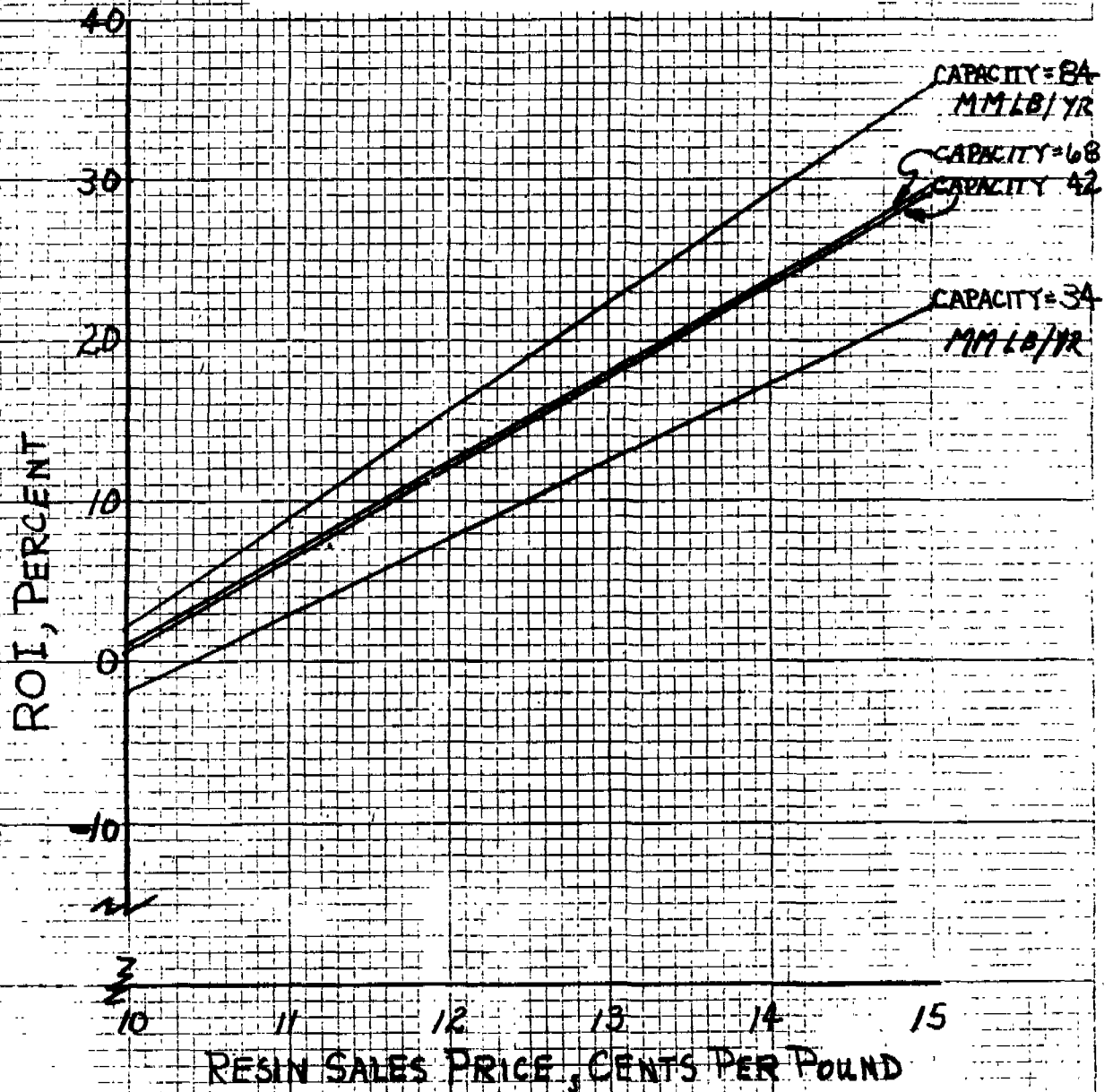


FIGURE 1.

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10 X 10 TO THE INCH 46 0700
2 X 10 INCHES
PLUTON & CO. INC.

ROI vs Gross Fixed Investment
for 42 MM lb/yr Plant
at Various Resin Sales Prices

25 MM lb/yr @ 6% Overhead; Bulk Distribution
17 MM lb/yr @ 13% Overhead; Distribution
in Bags

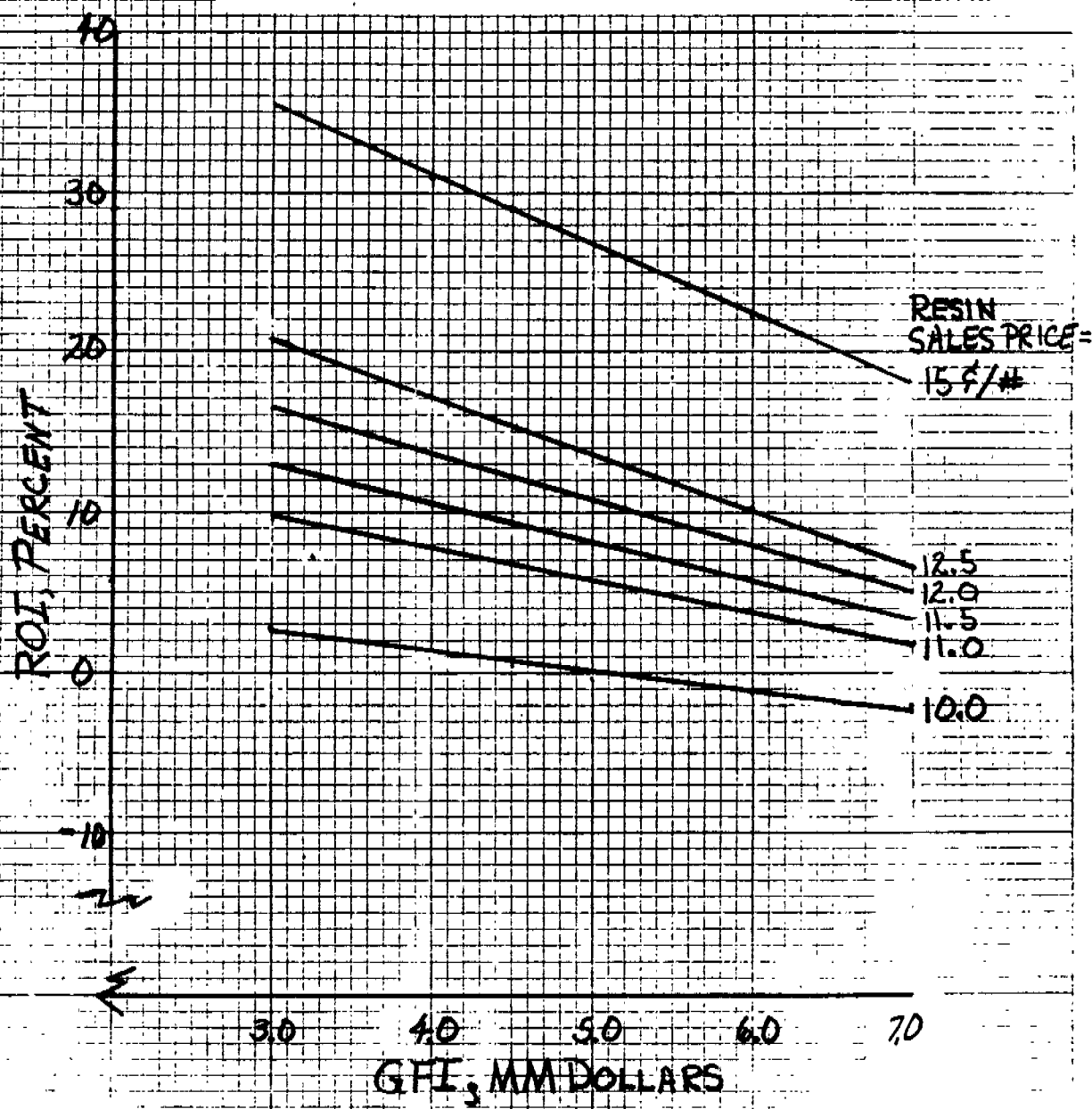


FIGURE 2.

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10 X 10 TO THE INCH 46 0700
10 X 10 INCHES
KEUFFEL & ESSER CO.

Case 2 - Resin for Fibers & Fabrics

Make by P-S-G Process or Buy @ 11.5 ¢/lb

Make Option: Buy P-S-G Plant for \$4.0 MM, add
\$0.5 MM for Miscellaneous and non-
plant investment; TUGFI = \$4.5 MM
Assume capacity = 42 MM lb/yr
Supply 20 MM lb/yr to Fibers & Fabrics
Sell 22 MM lb/yr to customers @ 11.5 ¢/lb
Credit sales against operating cost

Buy Option: Buy 20 MM lb/yr P-S-G resin @ 11.5 ¢/lb

	<u>Make Option</u>	<u>Buy Option</u>
(M\$ except as noted)		
Direct Cost	1,600	
Period Cost	800	
Royalty Payments	<u>200</u>	
Total Plant Cost	2,600	2,300
Dist. 20 MM lb @ \$0.018/lb	360	
22 MM lb @ \$0.020/lb	440	
O. H. @ 13% on NIFS	330	
5% on F & F Use	<u>110</u>	
Total Operating Cost	3,840	2,300
Less NIFS	<u>2,530</u>	
Net Operating Cost	1,310	
Plus Depreciation	<u>360</u>	
	1,670	

Saving = 2,300 - 1,670 = 630

New Fixed Investment	4,500	0
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Working Capital

Cash: .12 x Total Oper. Cost	460	.04 x T.O.C.	92
A. R.: .14 x NIFS	354	.04 x T.O.C.	-92
Inv.: .25 x P.C.	<u>650</u>	1/12 x T.O.C.	<u>190</u>

Total Investment	5,964	190
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Differential Investment = 5,964 - 190 = 5,774

ROI = $\frac{630}{5,774} \times 100 = 11\%$

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Case 3 - DCF Return on the following basis:

UCC and Ford jointly purchase plant.

Total purchase price = \$6,000,000

If Ford advances \$4,000,000, UCC advances \$2,000,000

If Ford advances \$5,500,000, UCC advances \$ 500,000

UCC supplies working capital, operates plant, and sells first 25 MM lb/yr production to Ford at a specified reduction below market price.

Balance up to 25 MM lb/yr is transferred to Fibers & Fabrics Division -
Balance over 50 MM lb/yr sold to others.

Distribution costs = 1.65 ¢/lb to Ford, 1.80 ¢/lb to Fibers & Fabrics,
and 2.74 ¢/lb to others

Overhead - 13% NIFS for all outside sales
0% for transfers to Fibers & Fabrics

Plant capacity = 42 MM lb/yr, UCC expands to 84 MM lb/yr in 1972
for \$2,500,000

Direct and period costs, royalty payments, and working capital
factors same as in Case 1.

Depreciation - Sum-of-the-years digits method, 15-year project life.

Tax rate = 53% in 1969, 48% in 1970-1984

Figure 3 shows DCF return from UCC's viewpoint vs. reduction in
resin sales price to Ford.

Figure 4 shows DCF return and percent ROI from Ford's viewpoint
vs. reduction in resin sales price to Ford.

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UCC VIEWPOINT

UCC & Ford Jointly Purchase Plant

Total Cost = \$6.0 MM

Plant Capacity = 42 MM lb/yr

UCC Expands to 84 MM lb/yr in 1972

25 MM lb/yr to Ford

25 MM lb/yr to F & F

Balance Sold to Others

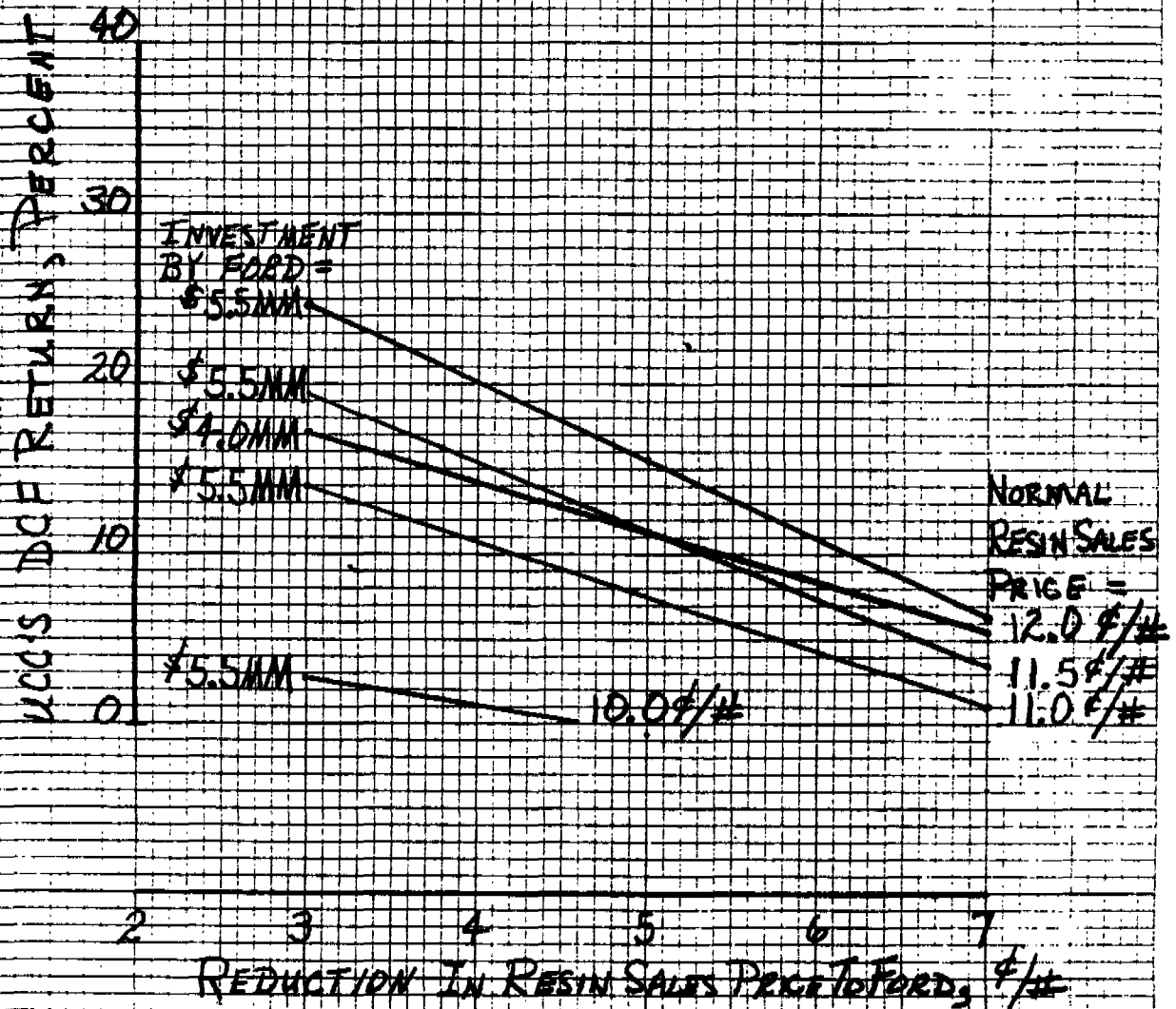


FIGURE 3.

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UC 330-13

CASH FLOW WORK SHEET

UCC CAPITAL BUDGET PROCEDURE

COMPANY	PROJECT
UCC's VIEWPOINT	UCC & FORD JOINTLY PURCHASE PLANT
CASE	
FORD INVESTS \$5.5 MM, GETS 5 ¢/lb Price Reduction; Normal Sales Price = 12 ¢/lb	

M-Dollars	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984				
1. New Fixed Investment	-500	0	0	-2500	0	0	0	0	0	0	0	0	0	0	0	0	0			
2. Transfer of Supporting Fixed Invest.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
3. Total Fixed Investment	-500	0	0	-2500	0	0	0	0	0	0	0	0	0	0	0	0	0			
4. Cash	-180	0	0	0	-328	0	0	0	0	0	0	0	0	0	0	0	0			
5. Accounts Receivable	-245	0	0	0	-571	0	0	0	0	0	0	0	0	0	0	0	0			
6. Inventory	-651	0	0	0	-523	0	0	0	0	0	0	0	0	0	0	0	0			
7. Working Capital	-1076	0	0	0	-1422	0	0	0	0	0	0	0	0	0	0	0	2498			
8. Total Investment	-1576	0	0	-2500	-1422	0	0	0	0	0	0	0	0	0	0	0	2498			
Sales to Ford	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	0			
9. Sales to Others	0	0	0	0	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	4080	0			
10. Base Cost Transfers to F & F	2040	2040	2040	2040	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	0			
11. Cash Receipts																				
12. Plant Cost	-2604	-2604	-2604	-2604	-4695	-4695	-4695	-4695	-4695	-4695	-4695	-4695	-4695	-4695	-4695	-4695	0			
13. Distribution	-706	-706	-706	-706	-1782	-1782	-1782	-1782	-1782	-1782	-1782	-1782	-1782	-1782	-1782	-1782	0			
14. Overhead	-227	-227	-227	-227	-758	-758	-758	-758	-758	-758	-758	-758	-758	-758	-758	-758	0			
15.																				
16.																				
17. Total Net Operating Cost	-1497	-1497	-1497	-1497	-4235	-4235	-4235	-4235	-4235	-4235	-4235	-4235	-4235	-4235	-4235	-4235	0			
18. Operating Income	253	253	253	253	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	0			
19. Depreciation, Amortization & Depletion	63	58	54	362	337	312	287	262	237	212	187	162	137	112	87	125				
20. Income Before Tax	190	194	198	-110	1258	1283	1308	1333	1358	1383	1408	1433	1458	1483	1508	-125				
21. Income After Tax	89	101	103	-57	654	667	680	693	706	719	732	745	758	771	784	-65				
22. Annual Cash Income	152	159	157	305	991	979	967	955	943	931	919	907	895	883	871	60				
23. Annual Cash Flow	-1424	159	157	-2195	-431	979	967	955	943	931	919	907	895	883	871	2558				
24. 10% Discount Factors	1.000	.909	.826	.751	.683	.621	.564	.513	.467	.424	.386	.350	.319	.290	.263	.239	.218	.198	.180	.164
25. Annual Present Value	-1424	144	130	-1648	-294	608	545	490	440	395	355	317	286	256	229	611				
26. Cumulative Present Value	-1424	-1280	-1150	-2798	-3092	-2484	-1939	-1449	-1009	-614	-259	58	344	600	829	1440				

DCF Return 15.8

Average ROI 22.6

 Max. Cash Commitment

FORD VIEWPOINT

UCC & Ford Jointly Purchase Plant
 Total Cost = \$6.0 MM
 Plant Capacity = 42 MM lb/yr
 UCC Expands to 84 MM lb/yr in 1972
 25 MM lb/yr to Ford
 25 MM lb/yr to F & F
 Balance Sold to Others

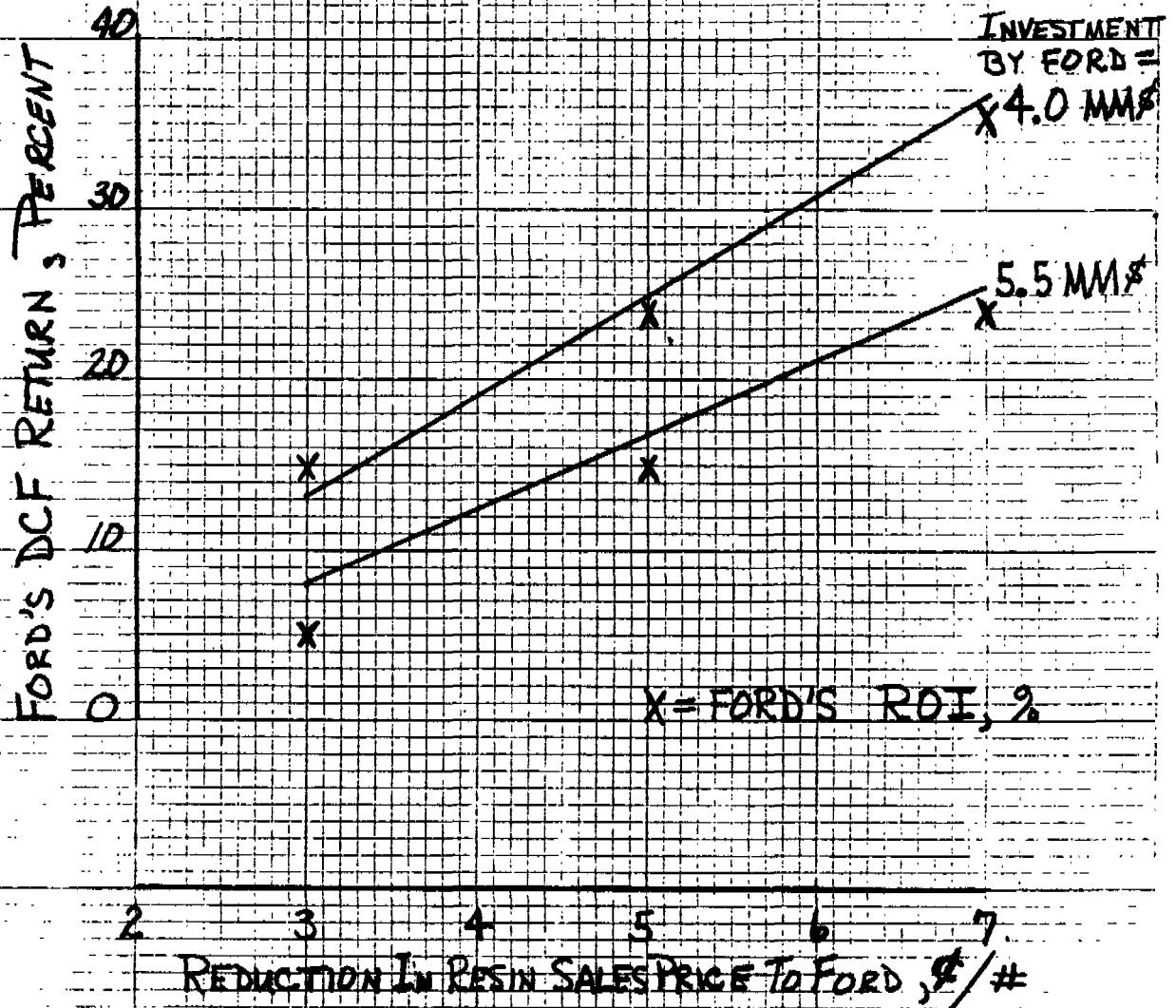


FIGURE 4.

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CASH FLOW WORK SHEET
UCC CAPITAL BUDGET PROCEDURE

COMPANY	PROJECT
FORD's VIEWPOINT	UCC & FORD JOINTLY PURCHASE PLANT
CASE	
FORD INVESTS \$5.5 MM, Gets 5 ¢/lb Price Reduction	

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984				
1. New Fixed Investment	-5500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
2. Transfer of Supporting Fixed Invest.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
3. Total Fixed Investment	-5500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4. Cash	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
5. Accounts Receivable	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
6. Inventory	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
7. Working Capital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
8. Total Investment	-5500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
9. Sales	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
10. Plant Cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
11. Cost Reduction	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	0				
12.																				
13.																				
14.																				
15.																				
16.																				
17. Total Net Operating Cost	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	0				
18. Operating Income	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	0				
19. Depreciation, Amortization & Depletion	688	642	596	550	504	458	412	367	321	275	229	183	137	92	46	0				
20. Income Before Tax	563	608	654	700	746	792	838	883	929	975	1021	1067	1112	1158	1204	-0				
21. Income After Tax	264	316	340	364	388	412	435	459	483	507	531	555	579	602	626	-0				
22. Annual Cash Income	952	958	936	914	892	870	848	826	804	782	760	738	716	694	672	0				
23. Annual Cash Flow	4548	958	936	914	892	870	848	826	804	782	760	738	716	694	672	0				
24. 10% Discount Factors	1.000	.909	.826	.751	.683	.621	.564	.513	.467	.424	.386	.350	.319	.290	.263	.239	.218	.198	.180	.164
25. Annual Present Value	4548	871	774	686	604	540	478	424	375	331	294	258	228	201	176	0				
26. Cumulative Present Value	4548	-3677	-2903	-2217	-1613	-1073	-595	-171	204	535	829	1087	1315	1516	1692	1692				

DCF Return 16.9
Average ROI 16.1

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Case 4 - ROI vs. Resin Sales Price on the following basis:

Lease plant from Dow - Produce 42 MM lb/yr for outside sales.

Direct and period costs and royalty payments same as in Case 1.

Figure 5 shows ROI vs. resin sales price from UCC's viewpoint at various lease fees.

Figure 6 shows ROI vs. annual lease fee and DCF return vs. annual lease fee from Dow's viewpoint.

In this case, DCF returns were calculated on the basis of a nine-year project life and are not directly comparable to the DCF returns calculated in Case 3, which were on the basis of a 15-year project life.

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UCC VIEWPOINT

LEASE PLANT FROM DOW FOR 9 YEARS
(1969 - 1977)

Plant Capacity = 42 MM Lb/Yr

All Outside Sales @ Overhead = 13% NIFS

Distribution = 2 ¢/Lb for all Sales

UCC Spends \$500,000 for Non-Plant Investment

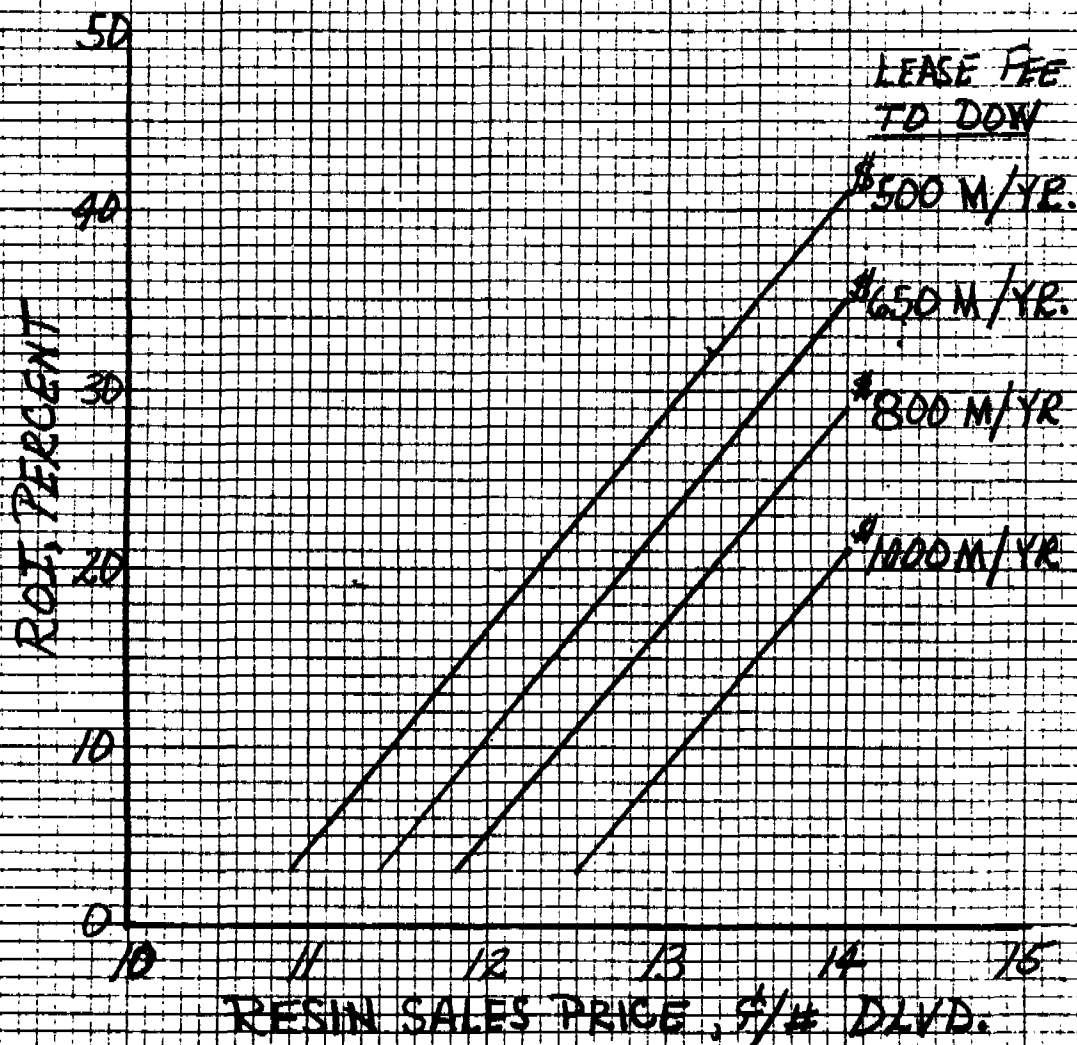


FIGURE 5.

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Sample Calculation for UCC's Return on Investment in Case 4

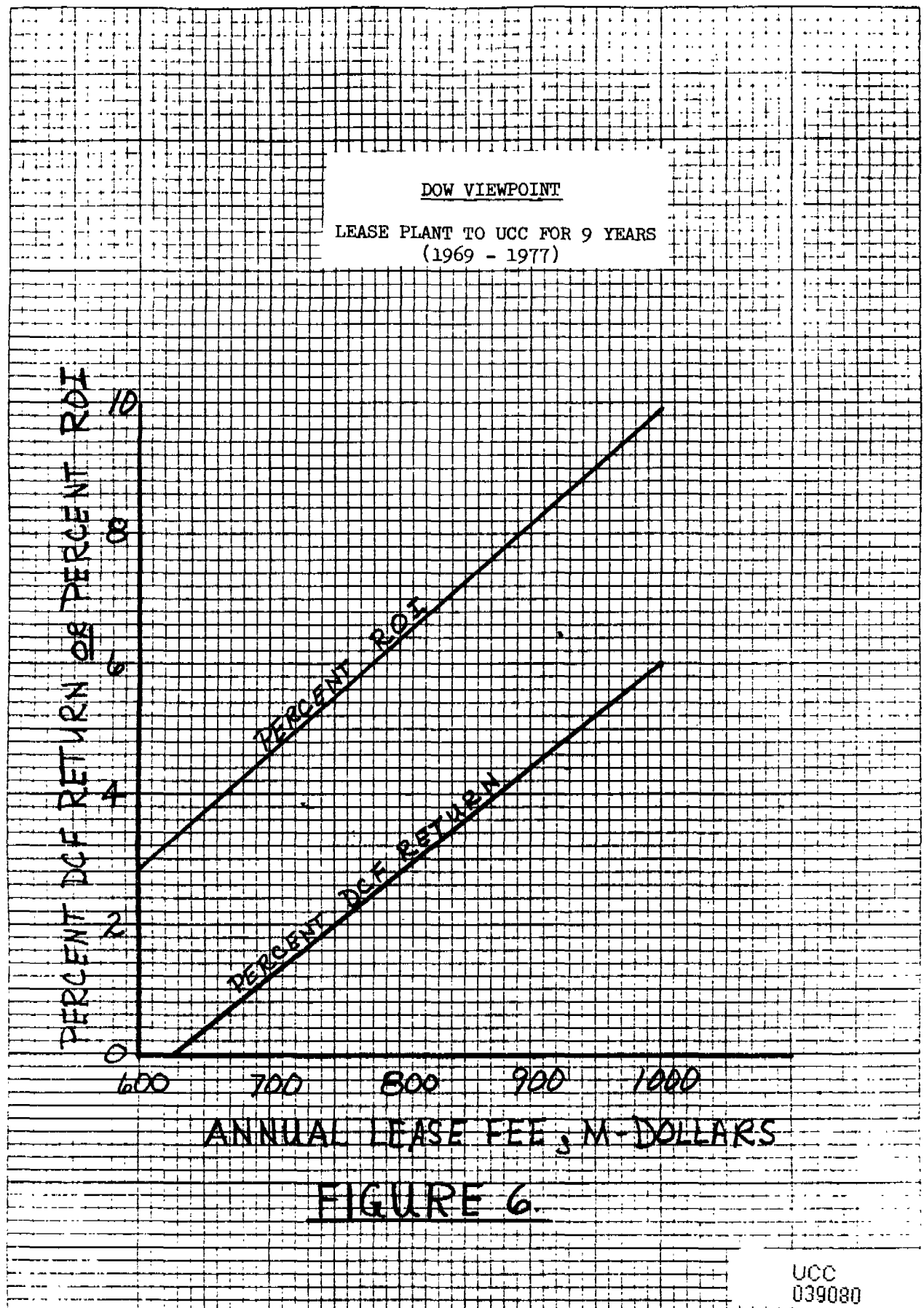
(M\$ Except Where Noted)

Gross Production, M Lbs	42,000
Sales Price, ¢/lb	12.5
Net Sales Value	5,250
Plant Cost, including royalty	2,620
Distribution	840
Overhead	680
Lease fee	<u>800</u>
Total Operating Cost	4,940
Operating Income	310
Depreciation	40
ROI Income	270
New Fixed Investment	500
Working Capital,	
Cash: 0.12 x Total Oper. Cost	595
Acct. Rec.: 0.14 x Net Sales Value	735
Inventory: 0.25 x Plant Cost	<u>650</u>
Total Investment	2,488
ROI, %	<u>11</u>

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Sample Calculation for Dow's Return on Investment in Case 4

(M Dollars)

Case of \$800,000 annual leasing fee.

Operating Income	800
Depreciation (8% GFI)	<u>446</u>
ROI Income	354
Total Investment	5,575
ROI, %	<u>6.4</u>

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UC 396-18

CASH FLOW WORK SHEET
UCC CAPITAL BUDGET PROCEDURE

UC 384-18						COMPANY						PROJECT											
CASH FLOW WORK SHEET						DOW's VIEWPOINT						LEASE PLANT TO UCC FOR \$800 M/YR											
UCC CAPITAL BUDGET PROCEDURE						CASE																	
		1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	Rec. Year											
1.	New Fixed Investment	-5575	0	0	0	0	0	0	0	0	0	0											
2.	Transfer of Supporting Fixed Invest.	0	0	0	0	0	0	0	0	0	0	0											
3.	Total Fixed Investment	-5575	0	0	0	0	0	0	0	0	0	0											
4.	Cash																						
5.	Accounts Receivable																						
6.	Inventory																						
7.	Working Capital																						
8.	Total Investment																						
9.	Sales																						
10.	Plant Cost																						
11.	Cost Reduction																						
12.																							
13.																							
14.																							
15.																							
16.																							
17.	Total Net Operating Cost																						
18.	Operating Income	0	800	800	800	800	800	800	800	800	800	0											
19.	Depreciation, Amortization & Depletion	0	860	785	715	645	572	500	440	358	286	414											
20.	Income Before Tax	0	-60	15	85	155	228	300	360	442	514	-414											
21.	Income After Tax	0	-31	8	44	81	118	156	187	230	267	-215											
22.	Annual Cash Income	0	829	793	759	726	690	656	627	588	553	199											
23.	Annual Cash Flow	-5575	829	793	759	726	690	656	627	588	553	199											
24.	10% Discount Factors	1.000	.909	.826	.751	.683	.621	.564	.513	.467	.424	.386	.350	.319	.290	.263	.239	.218	.198	.180	.164		
25.	Annual Present Value	-5575	753	655	570	496	429	370	322	275	234	77											
26.	Cumulative Present Value	-5575	-4822	-4167	-3597	-3101	-2672	-2302	-1980	-1705	-1471	-1394											
DCF Return 3.0%																							

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