DW's
first draft,

LONG RANGE PLAN

1976

DIELECTRICS

0023023

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A. Strategic Summary

1. Withdraw from supply of chlorinated biphenyl (PCB) dielectrics in USA/Canada by 1/1/78.

2. Establish MCS-1238 as the major replacement for PCB in capacitors in USA and Canada.

3. On the basis of 2., establish MCS-1238 as a major replacement for PCB in capacitors in Europe, Japan, and other major markets as they move away from PCBs. Discontinue Newport PCB production by 1/1/79.

4. Continue transformer PCB replacement evaluation until June, 1976, and if, at that time, no strong candidate can be supported, phase out of PCB transformer fluids (by 1/1/78) without a replacement from Monsanto.

5. If we maintain a viable business in dielectrics, seek growth through developmental programs such as cable dielectric/coolants and transformer oil modifiers.

B. Results and Goals

Results

1. Phase out of PCB production in USA by 1/1/78 and in U.K. by 1/1/79.

2. Successfully replace Aroclor 1016 (Aroclor 1342 in Europe) with MCS-1238 in capacitors.

   a) Achieve in 1979 a performance income of $4.5 $\overline{M}$.

   b) Achieve sales volume in 1979 of 19.5 $\overline{M}$ lbs. worldwide.

3. Replace transformer PCB range with a product generating 40% GP and with a sales volume of 6-10 $\overline{M}$ lbs. per year by 1979.

4. Maintain Monsanto image as a responsible company during the transition from PCBs and in the clean-up phase following discontinuation of PCB production while recovering the costs for this involvement.

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Goals

1. Sales at 1976 will be at budget: $17,570 M

Domestic Capacitor	$ 6,561 M
Domestic Transformer	4,570 M
U. S. Export Capacitor	1,187 M
U. S. Export Transformer	1,680 M
Ex-USA Capacitor	2,641 M
Ex-USA Transformer	931 M

2. Achieve a performance income in 1976 of: ____?____.

Domestic and U. S. Export	$3,362 M
Ex-USA	?

3. MCS-1238 blending facility operating at design (11 M lbs./yr.) rate by 12/1/76.

4. Obtain customer commitment to MCS-1238 sufficient to support AR approval for project 3023 (Santosol/ Dielectric Project) by 12/31/76.

5. Reach a decision by June 30, 1976, on whether to continue a transformer fluid replacement program.

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C. General Summary of Action Steps

1. Complete environmental study on MCS-1238 (excl. 2-year feeding study) by June, 1976.

2. Obtain customer approval of MCS-1238 performance by 11/31/76. (G. E. approval is critical to proceed.)

3. Cooperate with capacitor industry/insurance groups to obtain approval for MCS-1238 capacitors in terms of safety by 9/30/76.

4. Establish raw material supply sufficient for forecast volumes of MCS-1238 in interim blending facility; supply to commence Oct. 1, 1976.

5. Complete construction of interim MCS-1238 blending facility and start-up by Oct. 1, 1976.

6. Obtain AR approval for CEA 3023 project (MIPB/TXS/blending) by Dec. 31, 1976.

7. Cooperate with G. E./Westinghouse to complete model transformer evaluation of MCS-1839/TCB by June 1, 1976.

8. Cooperate with G. E./Westinghouse/Insurance Groups to establish fire resistance rating for MCS-1839/TCB by June 1, 1976.

9. Establish by Mar. 1, 1976, an environmental testing program which will completely evaluate MCS-1839/TCB by Mar. 1, 1977, (excl. 2-year feeding study).

10. Take decision by June 30, 1976, whether to continue a transformer replacement fluid program.

11. Continue to act responsibly within Monsanto Corporate policy on PCBs.

12. Establish European/Canadian/Latin American MCS-1238 capacitor evaluation programs to support a request for their commitment in 1977 - by June, 1976.

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Action

13. Increase dielectric domestic pricing Feb. 1, 1975, and review in June, 1976, to achieve the following objectives.

a) Maintain Capacitor/Transformer GP at 40%.

b) Additionally to generate additional income of approximately $2275 M over 18 months to cover:

- $575 M - Residual book value on direct Aroclor investment at Sauget at June, 1977

- $650 M - Direct investment plus expense of interim blending for MCS-1238

- $300 M - Potential additional MAT expenditure for accelerated environmental testing.

- $400 M - Reserve for dismantling and decontamination of Sauget Aroclor facilities

- $350 M - Decontamination of rail car fleet.

c) To adjust the price differential between transformer grades to eliminate Inerteen 54201 CM/100-42 from range without loss of 1976 income.

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D. Business Position Identification/Analysis

1. Our current range of products serve two major markets:

a) Dielectric liquids in capacitors (devices for storing electrical energy.)

b) Dielectric/coolant in special* fire resistant power transformers.

* Special - e.g. U.S.A. annual usage of PCB transformer fluids is approximately 1 M gallons compared to usage of mineral oil transformer coolants of 90 M gallons.

2. Capacitor Market

a) The worldwide potential expressed as M lbs. of Aroclor is:

1974	1975	1976	1977	1978	1979	1980	1985
50	37	43	46	47	49	50	56

b) A geographic breakdown is given in Chart 1.

c) In 1975, Monsanto held 58% of worldwide market.

d) Our major competitors outside of U.S.A. are:

Prodelec (France) - Monsanto Relative Share 3.2
Bayer (Germany) - Monsanto Relative Share 6.4

e) U. S. market (40% of world market) is under pressure to convert to non-PCB dielectric before 1/1/78.

f) Other world markets are forecast to follow later.

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g) We plan to progressively replace Aroclor with MCS-1238 (M lbs.).

	'74	'75	'76	'77	'78	'79	'80	'85
MCS-1238			1.3	11.0	16.5	19.5	20.5	23.5
Aroclor	32.5	21.5	23.3	12.2	4.0	0	0	0

See Chart 2.

h) In converting to non-PCB replacement capacitor fluids, major competition will not be with other producers of identical products to MCS-1238, but with alternative technologies.

e.g., Dow Fluid XFS-4169L
Phthalate Ester
Metallized Plastic Films

3. Transformer Market

a) The worldwide potential expressed as $\overline{M}$ lbs. of Aroclor-Trichlorbenzene blends is:

1974	1975	1976	1977	1978	1979	1980	1985
49	49	42	40	44	47	50	55

(Note: Aroclor on average represents 60% by weight of the blend.)

b) A geographic breakdown is given in Chart 3.

c) In 1975, Monsanto held 42% of the worldwide market.

d) Our major competitors outside of U.S.A. are:

Prodelec (France) - Monsanto Relative Share 1.8
Bayer (Germany) - Monsanto Relative Share 4.9

(Note: both of these are basic in chlorinated benzene while Monsanto purchases.)

e) The U.S. market (30% of world market) is under pressure to convert to non-PCB replacements. The French market (30%) and other European markets (22%) are not under the same pressure.

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f) We seek to replace PCBs with an alternative fluid in U.S.A. and Canada.

	'74	'75	'76	'77	'78	'79	'80	'85
PCB Transformer Fluid	21.5	20.7	17.2	10.2	2.2	0	0	0
Non-PCB Transformer Fluid	-	-	-	-	4.2	6.0	7.5	10.0

g) In the transition from PCB, competition will be:

- Silicones
- High flash point oil distillates
- Air-cooled designs
- Redesigned fire protected oil systems.

4. Based on our market franchise in chemical base dielectric fluids, we can seek growth opportunities for non-PCB fluids in new dielectric market segments which we expect to arise from a world shortage of naphthenic-based oils.

5. Price Trend

a) Capacitors

Prices domestically have tended to follow costs to yield a gross profit in the range 40-45% (See Chart 4A).

Prices in export markets have in recent years been relatively lower reflecting specifically French attempts to move volume. (See Chart 4A.)

The cost of Aroclor represents 4-5% of the total capacitor cost so that capacitor cost is comparatively insensitive to fluid price.

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b) Transformers

Prices domestically have tended to follow costs to yield a gross profit in the range 35-40%. (See Chart 4B.)

Prices in export markets have while following costs yielded relatively lower gross profits refelcting both the competitive edge of our competitors basic position in chlorinated benzenes and the French intention to move volume. (See Chart 4B.)

The cost of transformer PCB represents 20-25% of the cost of the transformer so that this market is much more sensitive to price change. Additionally, there is an ultimate ceiling on fluid price related to the cost of competing transformer installation designs.

c) Non-PCB Capacitor

Position to yield 40% minimum GP and performance income min. 25% on replacement capital.

d) Non-PCB Transformer

To achieve the desired performance income and sales volume, our cost for any replacement material must permit pricing no higher than 1.5 times 1975 PCB-blend price per gallon.

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CHART 1 (AS $\overline{M}$ LBS. AROCLOR)

WORLD AREA	M/I %	'74	'75	'76	'77	'78	'79	'80
U.S.A.	100	22	13	16	17	18	19	20
West Europe	25	15	12	15	15	15	15	15
East Europe	40-50	6	5	5	5	6	6	6
ROW	50	7	7	7	7	8	9	9
TOTAL	58	50	37	43	46	47	49	50

Note 1: Japan uses approx. 8-10 $\overline{M}$ lbs. per year of non-PCB capacitor dielectrics having banned PCB in 1972.

Note 2: Monsanto non-PCB candidate MCS-1238 will have usage of .75 lbs. for each 1 lb. of Aroclor replaced because of difference in specific gravity.

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CHART 2

a) MCS-1238 Sales From U.S.A. ($\overline{M}$ Lbs.)

	Domestic	U.S. Export (excl. Europe)	Europe	Total
1976	1.3	-	-	1.3
1977	9.3	1.5	0.2	11.0
1978	13.5	2.0	1.0	16.5
1979	14.0	2.5	3.0	19.5
1980	14.5	3.0	-	17.5
1985	16.0	3.5	-	19.5

b) MCS-1238 Sales From U.K.

1976	-	-	-	-
1977	-	-	-	-
1978	-	-	-	-
1979	-	-	-	-
1980	3.0 1361	-	-	-
1985	4.0 1814	-	-	-

c) Aroclor Sales	Domestic	U.S. Export	U.K. Produced	Total
1976	14.6	2.8	5.9	23.2
1977	5.2	1.0	6.0	12.2
1978	-	-	4.0	4.0
1979	-	-	-	-
1980	-	-	-	-
1985	-	-	-	-

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CHART 3

TRANSFORMER MARKET ($\overline{M}$ LBS. AROCLOR/TCB BLEND)

WORLD AREA	M/I %	'74	'75	'76	'77	'78	'79	'80	'85
U.S.A.	100	14	14.5	10	5	12	14	15	18
West Europe	7-10	28	27.5	25	23	25	26	28	30
Canada	100	3	3	3	3	3	3	3	3
Miscellaneous	25	4	4	4	4	4	4	4	4
TOTAL	42	49	49	42	40	44	47	50	55

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CAPACITOR

CHART 4A

	DOMESTIC SALES POUNDS	DOMESTIC SALES $	DOMESTIC GROSS PROFIT	DOMESTIC %	EXPORT SALES POUNDS	EXPORT SALES $	EXPORT GROSS PROFIT	EXPORT %	TOTAL D & E SALES POUNDS	TOTAL D & E SALES $	TOTAL D & E GROSS PROFIT
1958					1218	180	65	36			
1959					990	151	62	41			
1960	15926	2105	886	42	930	139	58	42	16856	2244	944
1961	15913	2099	889	42	1371	216	92	42	17284	2315	981
1962	15325	2039	911	44	1314	190	82	43	16639	2229	993
1963	15606	2067	898	43	1640	247	111	45	17246	2314	1009
1964	19532	2585	1363	52	1033	137	67	49	20565	2722	1430
1965	23880	3112	1528	49	1513	224	109	49	25393	3336	1637
1966	28393	3767	1971	52	2879	395	168	43	31272	4162	2139
1967	29392	3953	1749	44	3361	458	205	45	32753	4411	1954
1968	30549	4172	2051	49	4489	612	261	43	35038	4784	2312
1969	25022	3393	1528	45	3454	527	233	44	28476	3920	1761
1970	27583	3872	1725	44	4717	699	255	36	32300	4571	1980
1971	17369	2748	978	35	3288	485	118	24	20657	3233	1096
1972	22654	4271	2108	49	3069	517	139	27	25723	4788	2247
1973	37742	7756	2259	29	4333	837	276	33	42075	8593	2535
1974	22098	6731	2753	40	2483	720	264	37	24581	7451	3017
1975P	13468	5092	1957	38	2270	968	332	34			

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TRANSFORMER

CHART 4B

	DOMESTIC				EXPORT				TOTAL D & E		
	SALES		GROSS		SALES		GROSS		SALES		GROSS
	POUNDS	$	PROFIT	%	POUNDS	$	PROFIT	%	POUNDS	$	PROFIT
1958					983	156	43	27			
1959					1189	192	46	24			
1960	14409	2176	760	35	1324	213	57	27	15733	2389	817
1961	11752	1786	657	37	1277	207	59	28	13029	1993	716
1962	10854	1667	637	38	1449	236	75	32	12303	1903	712
1963	11079	1668	627	37	1326	215	68	32	12405	1883	695
1964	12043	1279	755	59	2318	365	146	40	14361	1644	901
1965	13086	1912	752	39	2340	354	119	34	15426	2266	871
1966	12637	1914	778	41	3379	492	162	33	16016	2406	940
1967	16338	2430	866	36	3110	476	177	37	19448	2906	1043
1968	14450	2208	848	38	3238	515	178	35	17688	2723	1026
1969	14942	2286	869	38	4125	659	213	32	19067	2945	1082
1970	15902	2494	956	38	5454	853	259	30	21356	3347	1215
1971	14007	2571	879	34	5383	926	262	28	19390	3497	1141
1972	11384	2378	825	34	3673	686	172	25	15057	3064	997
1973	13415	2751	864	31	4014	802	202	25	17429	3553	1066
1974	13870	4522	1516	34	4093	1290	333	26	17963	5812	1849
1975P	14202	5884	2326	40	4454	1791	532	30			

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