

MONSANTO COMPANY
APPROPRIATION REQUEST

To: Mr. C. H. Sommer,
President

Date: June 3, 1968

cc: Messrs.
J. M. Depp (2)
P. J. Dowd
Finis Morgan
E. J. Putzell
H. F. Weaver
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ORGANIC CHEMICALS DIVISION

Anniston Plant

Request No. 1892
Forecast No. 833A (Approved 4/1/68)
First Listed in Construction Program 4/1/68

TITLE: BIPHENYL EXPANSION
(Functional Fluids Product Group)

This project covers modification of existing No. 1 Biphenyl furnace to match the technical developments and increased capacity achieved when No. 2 furnace was installed. It also includes modification of the biphenyl distillation column to accommodate the increased capacity.

The above modifications will increase our Anniston biphenyl capacity from 65M to 88M lbs/year.

Biphenyl is the back-up raw material for Aroclor. Seventy-five per cent of our domestic production is consumed internally with the remaining sold for a number of non-fluid end-uses and to Dow to supplement their biphenyl production for Dowtherm fluids.

Monsanto enjoys an excellent position in Aroclor production, world-wide, and in the domestic merchant biphenyl market. This position carries the obligation to maintain sufficient capacity to meet, at all times, the total Aroclor and biphenyl needs of our domestic customers. To insure this, we must maintain capacity in excess of our forecasted average annual sales of Aroclor and biphenyl. We have set this excess at 30%.

In 1968, our domestic Aroclor capacity is only 2% above forecasted domestic and export sales. Our biphenyl capacity is about 3% below our requirements for Aroclor production and merchant sales.

DSW 181236

The approved Aroclor expansion at Krummrich and Anniston (Request Nos. 1430 & 1800), scheduled for completion in early 1969, will satisfy our domestic and export sales and excess capacity requirement through 1972.

The proposed Biphenyl expansion will provide adequate capacity to meet our Aroclor and merchant sales forecast through 1971, but will still be short of the 30% excess capacity requirement. Therefore, an additional appropriation request for a third Biphenyl furnace, to be built in a location other than Anniston, will be submitted in mid-1969 for completion by late 1970. This should bring our biphenyl capacity in line with our Aroclor capacity, meet our merchant sales through 1972, and satisfy the additional requirement that we maintain dual manufacturing locations for Aroclor and its back-up raw material.

This project is submitted as a non-earning project since the additional biphenyl capacity is necessary to supply raw material for the approved Aroclor expansion, (R.N. 1430 & 1800). The Aroclor project did not include an allowance for biphenyl expansion because, at the time it was submitted, the biphenyl volume and capital figures were not as yet identified.

The current average return on investment for our Aroclor family of products is in the range of 12%, expected to drop to 11.1% by 1971. With the already approved expansion for Aroclor, the return will be 10.5% in 1971 at 75% capacity. This present project will further reduce the return of our Aroclor family, but only by 0.3 percentage point to 10.2%.

In 1967, our average return on investment for our merchant biphenyl was 32.9%. In 1971, incremental sales of biphenyl from the expanded facilities will continue to earn an attractive 25% return on new capital.

The Central Engineering Department has reviewed this request and approves of it as related to their areas of responsibility.

NEW FIXED CAPITAL REQUESTED	\$770,000
ALLOCATED FIXED CAPITAL	--
WORKING CAPITAL	--
GROSS INVESTMENT	\$770,000
RETURN ON NEW FIXED CAPITAL	(Non-Earnings)

Original Signed By Tom K. Smith, Jr.

General Manager

II. PREMISES

Volume

The forecasted usage volume of biphenyl shown in Section IV is considered reliable and indicates that requirements for internal use, as Aroclor raw material, plus merchant sales will exceed our present capacity. Continued growth of our Aroclor family of products is anticipated based on past history and the potential of numerous new products and applications now in their development stage. Our forecast for Aroclor has been consistently low -- we are currently running 10% over our sales forecasted last year. In addition, negotiations now underway to supply 10M lbs./yr. of biphenyl to Dow, if successful, would immediately put us in a significant capacity deficit position.

Price

Biphenyl used for Aroclor production is transferred at cost plus back-up capital. Aroclor prices vary widely depending on end use. The average of the total product mix is 17.0¢ per pound, excluding credit from by-product Muriatic Acid. No significant price changes are anticipated that would adversely affect the total income from operations. A 1¢ per pound price change is equivalent to 2.6% change in ROI.

There is a wide range of prices for merchant biphenyl. Bulk sales to Dow are at 10.5¢ per pound. Flake sales, primarily to dye carriers and citrus fruit wraps, are 17¢ per pound. Export sales are at 8¢ per pound. Overall merchant sales average at 12.1¢ per pound. A reduction of 1-2¢ per pound is forecasted for flaked biphenyl. Export sales, on the other hand, are scheduled to increase to 10¢ per pound. By 1970, the average price of biphenyl is targeted at 10.8¢ from the present 12.1¢.

Raw Materials

The raw material involved is benzene. No shortages are anticipated. Pool prices have been used for benzene consumed at present operating levels. Benzene for the expanded needs has been costed in at market values. These prices have been cleared with the Hydrocarbon and Polymers Division and the Central Purchasing Department.

Net Effect

The premises in this project are realistic. We have no indications of potential variances in these premises which would significantly change the indicated ROI.

III. ALTERNATE COURSES

The following alternate courses have been considered:

1. Do not expand biphenyl capacity. Our present capacity will suffice for Aroclor production to meet requirements through 1970. However, this would require that we decrease and eventually terminate merchant sales of biphenyl. Such action would force Dow to expand their facilities and possibly induce others to enter the biphenyl market. If this should happen, our Aroclor position would be jeopardized.
2. Install a third biphenyl furnace. Eventually, this will be necessary to meet forecasted requirements beyond 1970. However, this expansion cannot be accomplished soon enough to meet our 1969 needs. This alternate would again result in loss of sales with its potentially undesirable consequences stated in Alternate No. 1 above.
3. Buy biphenyl from overseas producers. This is not feasible since biphenyl is in short supply worldwide. We now sell biphenyl to Aroclor producers in Europe.

IV. MARKET

Demand

About 70% of our biphenyl production is consumed internally for Aroclor manufacture. The balance is available for merchant sales. We are the only domestic merchant of biphenyl. Dow is the only other domestic producer. All of their production is consumed internally for their Dowtherm heat exchange fluids. They presently purchase incremental amounts of biphenyl from us. Negotiations are underway to supply 10M lbs./yr. of biphenyl to them.

The balance of our biphenyl sales are primarily for dye carriers (several customers) and citrus fruit wraps (Crown-Zellerbach.)

Our current forecast for biphenyl for domestic Aroclor production and for merchant sales in thousands of pounds, is as follows:

BIPHENYL REQUIREMENTS - DOMESTIC AND EXPORT (in thousands of pounds)

	<u>FOR MERCHANT SALES</u>	<u>FOR AROCLOR PRODUCTION</u>	<u>TOTAL BIPHENYL</u>	<u>BIPHENYL CAPACITY</u>	
1968	18.0	47.0	65.0	65.0	(Present Capacity)
1969	16.8	55.2	72.0	88.0	(Modification of No. 1 furnace)
1970	18.5	59.5	78.0	88.0	
1971	20.0	63.0	83.0	88.0	
1972	21.5	67.5	89.0	125.0	(New No. 3 furnace)

Merchant sales in 1968 include biphenyl sales to MCL to supplement their production during renovation of their biphenyl unit. These sales are not expected to continue beyond 1968.

There are no indications that our merchant sales will be adversely affected in the near future, provided Dow does not expand capacity and enter the merchant market. The likelihood of biphenyl imports is low because of worldwide shortage of this product and because of duty and freight costs.

Supply

Monsanto enjoys an excellent position in the Aroclor and merchant biphenyl market in the U.S.A. Adequate biphenyl production to support merchant sales and especially Aroclor production is the key to maintaining this position.

We hold an excellent competitive position in manufacturing costs because of high divisor and low raw material cost. We know of no major expansion plans by any of our competitors except Dow.

Supply, cont.

Details concerning markets, objectives and plans for our various Aroclor-base products are contained in Total Product Strategies covering Pydrauls, Therminols, Capacitor Aroclors, Transformer Askarel, etc. Justification for our planned Aroclor expansion has been presented in Appropriation Requests #1430 and 1800, which were approved by the Executive Committee in 1967.

Price

Our forecasts on merchant biphenyl pricing are as follows:

<u>Pricing Net Back</u>	<u>Bulk</u>	<u>Flakes</u>	<u>Export</u>	<u>Over-All</u>
1968	10.5	17.0	8.0	12.1
1969	8.0	16.0	12.0	11.2
1970	8.0	15.0	12.0	10.8
1971	8.0	15.0	11.0	10.7
1972	8.0	15.0	10.0	10.6

Bulk sales are all to Dow. Flake sales are primarily for dye carriers (several customers) and citrus fruit wraps (Crown-Zellerbach).

We do not expect any major change in the high profitability of Aroclor over the next few years.

V. TECHNOLOGY

The process technology for biphenyl is well established after years of operation. Yields and costs are such as to most likely preclude any new and radically different route being developed which would obsolete our process. Incremental improvements in technology were developed and introduced in our No. 2 furnace. It is these improvements that would be incorporated into No. 1 furnace. Incremental technical improvements are now sought in preparation for the construction of the No. 3 furnace sometime in 1969 and 1970.

The areas of technological risk will remain the same as the No. 2 furnace.

Elements of reactor surface, residence time, heat release, and charge rates as they affect process requirements and conversion will be made identical to the present unit.

Furnace coils continue to be operated at conditions under which available alloys do have limited life and must be periodically replaced. Heat destruction proceeds to a point where local spot repairs become ineffective. Elements of exchangers used in the external auxiliaries also undergo gradual metallurgical destruction and deformation, requiring more frequent than normal replacement repairs.

Coke formation, an undesirable end-product of decomposition, will continue to be a factor requiring periodic de-coking and cleanout periods. Minor design revisions will allow equal or better conditions for coping with coke deposits.

VI. SIGNIFICANT CONTRACTS

There are no significant contracts existing or proposed which affect this project.

VII. PATENT SITUATION

The original patents on biphenyl have long expired. This also applies for Aroclor manufacture. However, Monsanto holds U.S. and foreign patents on various industrial hydraulic formulations containing Aroclor. Patent applications are constantly being filed on new fluid formulations and end uses. No known patent infringement problems exist.

VIII. EARNINGS

This project is submitted as a non-earning project since the additional biphenyl capacity is necessary to supply raw material for the approved Aroclor expansion, (R.N. 1430 & 1800). The Aroclor project did not include an allowance for biphenyl expansion because, at the time it was submitted, the biphenyl volume and capital figures were not as yet identified.

The current average return on investment for our Aroclor family of products is in the range of 12%, expected to drop to 11.1% by 1971. With the already approved expansion for Aroclor, the return will be 10.5% in 1971 at 75% capacity. This present project will further reduce the return of our Aroclor family, but only by 0.3 percentage point to 10.2%.

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IX. CAPITAL

Scope of Project

This project provides for upgrading the complete internals of the No. 1 Biphenyl Furnace, rearranging the preheaters and piping, adding external retention tanks, to the equivalent of the No. 2 Furnace installation. The biphenyl column auxiliaries will be modified to provide matching distillation capacity.

In addition, a 300,000 gallon benzene storage tank, and an unloading station is included. Acetone storage and feed will be relocated to the vacated present 50,000 gallon storage tank. Four of an existing group of six 10,000 horizontal storage tanks will be dismantled.

Some instrumentation, safety devices and equipment arrangement are included to ease workload, and make the operation of both furnaces comparable.

Estimate

Capital	
Machinery & Equipment	\$770,000
Building	0
Spares	<u>0</u>
Total Capital	\$770,000

Divisional Expense	
Dismantling	\$ 33,000
Repairs	38,500
Relocations & Modifications	<u>43,500</u>
Total Divisional Expense	\$115,000

<u>CED Expense</u>	
Start-up Engineering Expense	\$ 5,000

Central Engineering has based its process design and capital estimate on the data given in the Project Scope Report CEA-1892 dated April 3, 1968. Sufficient information is available for the preparation of a reliable estimate with the exception of information concerning the true capacity of the biphenyl column and the extent to which it needs modification. Sufficient time does not exist for complete definition of this portion of the project. For this reason, an undeveloped design contingency of \$170,000 has been included in the capital estimate to cover this modification.

Dismantling expense includes removing furnace stacks, vaporizer coils and supports, radiant tubes and supports, eight high temperature exchangers, four 10,000 gallon storage tanks, and miscellaneous piping.

Repair expense includes repairs to the furnace arch, hangers and firebrick, modification of furnace burners, alterations to the furnace shell, and alterations to the stripper.

Relocations include two benzene make-up pumps, and two acetone feed pumps.

Project Status

Pre-approval of \$100,000 was received. Long-delivery equipment has been ordered. Cancellation charges and accumulated engineering are expected to exceed this authority in about eight weeks as of April 8, 1968.

X. LEGAL

There are no known legal aspects of this project requiring Legal Department attention.

XI. TREASURY

There are no unusual Treasury Department problems in connection with this appropriation request. This project is listed in the April 1, 1968 Construction Program for \$490,000.

XII. PERSONNEL

No additional personnel will be required at Anniston.

Personnel in other functions are not affected.

XIII. RISK EVALUATION

A fire in the furnace caused by leaking benzene from a ruptured tube could cause the probable maximum loss.

The cost to repair the fire damage and the loss of the increased production capacity provided by this project would be approximately \$150,000. This project will reduce the existing hazards and loss exposure.

XIV. POLLUTION AND TOXICITY PROBLEMS

No unusual pollution and toxicity problems are created by this project. A full concrete dike will be provided for the benzene storage tank to contain an accidental release of benzene.

XV. INTERNATIONAL ASPECTS

Biphenyl is also manufactured at our Newport plant in the U. K. Expansion now underway at Newport will satisfy all MCL biphenyl requirements. Merchant sales of biphenyl in Europe will be supplied by production from MCL. All European and Japanese producers of biphenyl are captive users and have little capacity available for merchant sales. This situation is expected to prevail for the foreseeable future.

XVI. CORPORATE DISTRIBUTION REVIEW

This project introduced no new physical distribution problem and is concurred in by Central Distribution in their area of responsibility.

XVII. CORPORATE PLANNING REVIEW

Current projections for 1968 indicate that biphenyl merchant sales demand are slightly in excess of available capacity. While biphenyl capacity is adequate for Aroclor through 1970, failure to expand would require reducing merchant biphenyl sales. This would adversely affect Monsanto's position. This project, combined with the approved Aroclor expansion (AR's 1430 and 1800) will bring new capital allocations to 3.67 million dollars and the Aroclor product line 1971 ROI to 10.2%. This compares with a Fluids Product Group Objectives Program ROI of 10.0%.

XVIII. SPECIFIC ACCOUNTING PROBLEMS

There are no special accounting problems involved in this project.