# APPENDIX F SUBSTITUTABILITY AND COMPLEMENTARITY OF STOCKPILING AND SYNTHETIC FUEL PROGRAMS

## A. INTRODUCTION

A fundamental justification for the synthetic fuels commercialization and the fundamental justification for the petroleum stockpiling programs is that dependence on imported oil, even if expected to be less expensive than domestic oil in the future, carries the possible substantial social cost of potential U.S. foreign policy and military dependencies upon the decisions of foreign oil producers. As stockpiling and synthetic fuel development (or any other substitute for imports) are complements over the planning horizon, optimality cannot be achieved through independent policy adjustment. They must be considered two integral parts of a general energy policy package.

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## B. STOCKPILING

The primary function of stockpiling is to provide additional time for political and economic resolution of import interruptions. A 90-day reserve supply of crude oil at the current import rate could, for example, provide about a year's protection against the loss of one-half of our non-secure imports. If crude were stored by the government in Gulf Coast salt domes, the annualized costs per barrel stored would be approximately $1.60 in constant 1975 dollars.1/ On this basis, the estimated opportunity costs (the earnings which would have occurred if those expenditures had instead been invested elsewhere within the economy) of storing 90-days supply of crude (6.5 MMB/D) would be approximately $940 million. A 180-days supply would cost $1.9 billion. It should be noted once again that these estimates are related to the annualized opportunity costs which are the relevant costs for policy decision making.

The initial budgetary outlays as opposed to the opportunity costs would depend on the source of crude oil. If crude is purchased from abroad the budgetary costs for the construction of the facilities and the purchase of the oil will be approximately $8.5 billion for a 90-day storage program and $17 billion for an 180-day program. On the other hand, if the oil is obtained from Elk Hills the production costs are estimated at about $1.40 per barrel. Transportation costs to the Gulf Coast would be in the neighborhood of about $1.00 per barrel. It is interesting to note that this transportation cost could be avoided by trading Elk Hills oil on the West Coast for oil imported or produced along the Gulf Coast area. The total estimate including the construction capital costs, transportation, and production cost would amount to a budgetary cost per barrel of $4.20. A 90-day supply would amount to about $2.5 billion. A 180-day supply would require about an outlay of $5 billion.

Both the annualized opportunity and budgetary cost estimates reported above are incomplete estimates. They tend to underestimate the costs because they assume that all imports are crude imports and that products would not have to be stored. There is now considerable opinion that under all plausible assumptions the U.S. can obtain effective protection during the relevant 90- or 180-day period only by stockpiling some products. A feasible crude/product storage mix may be in the area of 4.7 crude/1.8 product (computed from current ratio of product to crude imports and adjusted for slack refinery capacity). Because products are

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1/ From FEA working documents, assuming capital expenditures for oil at $13/bbl and for facilities at $1.80/bbl. Amortized at a 10% discount rate over 15 years.

more expensive to purchase and to store, a 90-day supply of both, based on the above ratio, would cost approximately $9.5 billion on a budgetary basis and $1 billion on an annualized cost basis if the crude and products are purchased in the import market.

The costs may be overestimated because private stockpiles have not been included. If 10% of current stocks (a likely maximum of availability given stock levels needed for efficient system operation) are available for emergency drawdown, there could be up to nearly a six-day supply of crude and a 41-day supply of products in the aggregate. Costs also may be overestimated because they are based on average costs of initiating a storage program de novo; however, if the government's salt dome storage plans could be integrated into the deep draft terminal plans of LOOP and SEADOCK, 2/ the construction and transportation costs per barrel would be considerably less. In order to take advantage of possible complementary programs, the government could, as FEA is currently doing, inaugurate a relatively early storage program of crude storage which could utilize the LOOP and SEADOCK facilities while leaving the question of the large optimal size storage program to be determined after further study. Other factors which tend to produce overestimation are the very low probability that all foreign imports would be curtailed and the fact that some of the loss could be absorbed by conservation measures. Hence, a 90-days supply of all imports might give the U.S. 180 days to a full year of effective supply against insecure source curtailment. This protection could be increased even further through acceleration of domestic and possibly secure sources of energy.

The advantage of stockpiling is the temporary protection it offers. It would provide interim protection against an embargo during which time alternate foreign and domestic energy sources could be increased, a political settlement could be reached, or a more orderly adjustment to lower levels of consumption could be achieved. If in the future the U.S. should become energy independent or foreign sources become secure, the oil in storage could be sold in the market.

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2/ Deep draft terminals, respectively off the Louisiana and Texas Coasts, possibly using salt domes as transition storage.

## C. SYNTHETIC FUEL COMMERCIALIZATION PROGRAM

The Synthetic Fuel Commercialization Program would decrease U.S. reliance on foreign suppliers by decreasing the U.S. oil import demand and by providing a technical and commercial supply framework which could be expanded. The level and variability of synthetic fuel cost estimates suggest they might be an expensive substitute for imported oil which is currently selling at about $13 per barrel and which may decrease in real terms within two to three years. However, because of the relative abundance of coal, synthetics could provide the U.S. with a long-term substitute for imported oil in the event of a lengthy embargo or a significant price increase in imported oil which was perceived as permanent. Thus, the crucial importance of the synthetic fuels commercialization program in U.S. energy policy is its potential capacity to supplant imports through incremental increases in demand arising from depleting domestic production in the 1990-2000 time frame. The program will advance an on-the-shelf technology. However, if synthetics are to be made available at some point in the future, some commercial development must begin before the need for expansion. Obviously, research and technical development should be undertaken now. In addition, limited commercial production is required to work down the learning curve, to develop logistical support, and work out the initial practical production kinks which always accompany a new production process. The commercial production necessary to accomplish these objectives is less than a million barrels a day. A gradual buildup to a production level of 250,000 to 350,000 Bbl/day would appear to accomplish these goals at a reasonable economic cost.

## D. AN INTEGRATED STOCKPILE - SYNTHETIC FUEL PROGRAM

A stockpile of a billion barrels (high annualized cost estimate for crude only: $1.6 billion) would enable the U.S. to have about 150 import-free days. However, the real protection offered by this stockpile would be equivalent to a year's supply of imports from non-secure sources. Assuming an embargo, the learning affects from previously constructed capacity could be expanded in existing plants and new plants, as part of a total energy strategy, could be undertaken. The potentially binding constraint affecting this strategy is of course the available supply of coal and its usage as a direct fired boiler fuel.

Because the fundamental justification for the stockpiling and the synthetics program is the existence of external costs in importing oil it is desirable that the trade-offs between the additional costs of these programs and their additional benefits be perceived as clearly as possible in both the economic and political processes and in the mechanisms for program financing.

A strategic storage of 90 days supply at the current import rate of crude and residual oil if needed could, together with planned conservation measures, provide a year of adjustment and reaction time in case of an interruption of half of our non-secure oil imports. As a protection against loss of imports for up to several years, a storage program would apparently be less costly than attempting to avoid imports by rapid development of synthetic fuels production.

But for the longer horizon, there will probably come a time when synthetic fuels costs less than imports plus storage. To prepare for that time, it is important to develop several commercial level synthetic fuel plants, to work down the learning and design curves as far as possible so that when a major building program is necessary the plants can be built under proven commercial designs and processes.