E. Suggested Modifications

One of the tasks to be accomplished during the course of the interviews was to collect suggested modifications to the various hypothetical terms and conditions of the nine incentives, as set forth in Appendix B (pp. 65-86) of the Phase II booklet. As will have been noted from the statements at the end of each of Incentives 7, 8 and 9, as set forth in the interview arrangements letter (incorporated herein as Appendix B), there were no hypothetical terms and conditions developed by FEA for the last three incentives. To quote from the interview arrangements letter:

> "For the purpose of this discussion it should be assumed that the terms and conditions applicable to the above options (7, 8 and 9) would be similar to those detailed in Appendix B of the Phase II booklet."

Consequently, the actual discussion of the hypothetical terms and conditions during the various interviews was limited to those set forth in the Phase II booklet for Incentives 1 through 6, alone.

A simplified outline of the principal hypothetical terms and conditions, set forth in Appendix B of the Phase II booklet, is included in this report as Appendix C. This outline was the work of Mr. P. R. Haas of Dow Chemical Company. For those who may not have immediate access to the Phase II booklet, the outline of Appendix C provides a useful summary of the principal hypothetical terms and conditions of each of the first six incentives discussed in the Phase III interviews.

The following paragraphs constitute the principal suggestions, offered by the 16 companies visited, for modifications of the hypothetical terms and conditions of the first six incentives.

Incentive 1. Direct Grant (2/3—1/3) for Pilot Plant: The default clause under which failure to meet agreed schedule by more than 30 days would be more realistic if a longer period (e.g., 90 days) were offered. A number of companies would prefer the government to support more than two-thirds of the total synfuel plant cost. A better definition of cost elements to be included is desired. The companies would prefer to retain all patent rights, with an appropriate license to the government for foreground

rights based on a pro-rata amount proportional to government funding. A number of companies stated that the "follow-on use of technology" period of 180 days should be extended, and the indemnification clauses should be softened.

Incentive 2. Direct Grant (1/2--1/2) for Demonstration Plant: Better definition of cost elements is desired. Inflation indices appear to be needed for price adjustment, but none of the usual ones are considered satisfactory. Patent clauses more favorable to the industry are desirable.

Incentive 3. Convertible Grant: Questions exist as to the government's legal right to own equity in private corporations, as required by this incentive. New legislation probably would be required. Better definition of cost elements is desired. Patent restrictions are considered too stringent. Grant should be applicable to first commercial stage plants and the coverage extended to 90 percent. Conversion period should be extended beyond six months.

Incentive 4. Loan Guarantee: Any government loan guarantee should be "without recourse," that is, the equity investors should not be liable to the government for recovery of losses in case of loan default. The terms and conditions of this incentive should be made compatible with the terms and conditions of the purchase guarantee (CPFF), and the two offered as a preferred pair of incentives. (The possibility that the government might itself issue debentures was supported by some companies.)

Incentive 5. Guaranteed Procurement/Fixed Price: The inflation cost indices suggested were considered inappropriate; indeed, no common cost index of inflation was considered applicable, with the possible exception of the cost of steel. It was considered very difficult to determine a mutually acceptable fixed product price in light of the unproven synfuel technology involved.

Incentive 6. Guaranteed Procurement/Cost Plus Fixed Fee: Respondents desire that the five-year period of performance should be substantially extended to

ten, or even twenty, years. Better definition of cost elements is suggested. The allowed fee would be preferred to be greater than 10 percent of estimated costs.

In addition to the foregoing recommended modifications of the terms and conditions of the first six incentives discussed in Phase III, there were also three other principal suggestions which were commonly encountered during the interviews:

- The 90 percent loan guarantee should be combined in a package with the guaranteed procurement (CPFF) incentive.

- The federal government should devise an all-risk insurance program (much as FDIC insures savings deposits) to insure participants in a synfuels commercialization program.

- The government should assume all costs for the first commercial stage synfuel plant construction and operation, a la the World War II synthetic rubber precedent.

The popularity of the combined loan guarantee and guaranteed procurement has been noted in previous paragraphs and needs no further expansion. The combination of the two incentives together would undoubtedly constitute the most popular "single" incentive of the nine discussed with the sixteen companies.

The possibility of government insurance against all risks incurred during the development of a new synfuel technology, at least in the construction and operation of the first commercial plant of a particular technology, was a possible incentive not included in the set considered and formally proposed for discussion with the various companies in Phase III; but it was a popular incentive proposed by a number of the companies interviewed. Such a risk insurance program might be very attractive to the government, since the cost would be minimal (unless an unlikely catastrophe were experienced). In any event, an insurance program would delay government payments for several years, pending outcome of plant construction and initial operation, and would assure companies against financial risk at minimal cost to the government. It would remove the uncertainties which hinder all the companies in the development of the first commercial scale synfuels plants.

An incentive based on the World War II development of synthetic rubber plants was proposed as in Phase I of the joint FEA/NSF program (Incentive 7). It was there described as a direct grant by the

federal government which would fund 100 percent of the cost of the first commercial-scale synthetic fuel plant, including R&D, similar to the practice followed in World War II in the synthetic rubber program. Companies interviewed were unanimous in their opinion that, until the first commercial scale plant for a particular technology were constructed and operated successfully, the companies and the nation's financial institutions would both be very hesitant to embark upon commercial scale operation of synfuels plants. Uncertainties as to success of the particular synfuels technology, possible impact of the various regulatory agencies (particularly environmental ones), and the cost of actual plant operations cannot be satisfactorily known until the first commercial-scale plant has proven itself. The companies interviewed would all prefer the government to shoulder those risks until the first plants had been successfully demonstrated.

The approach commonly suggested was that the government should solicit industry for proposals and award very large cost plus fixed fee contracts to the company or team of companies submitting the best proposal for construction and subsequent operation of a commercial-scale synfuel plant. The contract would provide for 100 percent cost reimbursement as well as a reasonable profit to compensate the contractors for assigning their best people to the project. The government would provide 100 percent of the special-purpose facilities required for the program, and would also provide the necessary raw materials, such as coal and oil shale reserves. A five-year development period probably would be required to demonstrate the economic feasibility of the program. At that point the government would probably be in a position to go forward to private industry with certain of the other economic incentives considered during the Phase III discussions for subsequent production. Industry might possibly go forward itself, depending upon demand and cost. Various options present themselves for the subsequent purchase by private industry of the plants from the government once they have proven themselves commercially. This approach was proven by the World War II experience with the synthetic rubber plants, and is the incentive preferred by all but one of the companies.

F. Legislative Implications

The enabling legislation, amendment of existing legislation, and review of existing regulatory authority required to achieve the objectives set in the spurring of synthetic fuel production are crucial. They will demand the most careful study and the preparation of detailed legislative and regulatory recommendations, if the purposes of this project are to be fulfilled.

In addition to the enabling legislation cited in "Spurring Synthetic Fuel Production"[5] the "crucial roadblocks" also entail legislative considerations that cannot be overlooked. Elaboration upon this latter requirement[6] reinforces the position that such study, review and recommendations will require the application of talents knowledgeable not only as to existing legislation but with regard to the mood and mechanisms of the Congress and the Executive Branch.

Beyond the citations referred to above, the following seven items would appear to deserve the most serious consideration:

1. Deregulation of the Natural Gas Industry: The existing authority of the Federal Power Commission may not be adequate in the current energy crisis. The unanimous reaction of companies visited confirms this view.

2. Direct Grant for Pilot Plant: The specific authorization and appropriation legislation required do not contain provision for the total grant on a no-year basis which is desired by industry.

3. Direct Grant for Demonstration Plant: The special legislative authority needed to permit the government to deviate from established procedures of the Federal Property Management Regulations (regarding sale of the plant to the contractor) requires the most careful and precise phrasing, so broad is the field of government interest and practice covered by these Regulations.

4. Convertible Grant: It is questionable that Public Law 85-804 can, without amendment, be properly used to authorize sale of gov-

---

[5] See p. 22.

[6] See pp. 25-6.

ernment property rights involving patents. To assume the present adequacy of Public Law 85-804 for this purpose would entail risk of embarrassment and impediment at a later date.

5. Loan Guarantee: The evident limitations of the Defense Production Act of 1950 require its amendment for loan guarantee purposes involving type of loan, amount of loan and term of loan, both to provide the essential incentive to industry and for the protection of the government. Several industry representatives interviewed expressed their approval of legislation similar to Title XI of the Merchant Marine Act of 1936. This deserves specific consideration.

6. Guaranteed Procurement: The issue of proprietary technology and patent rights looms large in this incentive. A thorough analysis of the advantages and disadvantages of government participation, to any degree, is imperative. Industry representatives interviewed were again unanimous as to the seriousness of this issue to them.

7. Executive Order 10789: Although it has been suggested that the President might take interim action by amending this Order to authorize federal agencies to contract for the production of synfuels under the provisions of Public Law 85-804, it cannot be assumed that such an initiative or the recommendations required to implement it will automatically be undertaken by the Executive Branch.

Given current differences of opinion between the Executive and Legislative Branches as to a national energy policy, it is again emphasized that only the most painstaking and knowledgeable assessment of the mood and procedures of the Congress can effect the desired legislative result.

G. Principal Conclusions and Recommendations

It is unlikely that any first commercial-scale synthetic fuel plant will be constructed without strong government participation. The synfuels industry is capital intensive. The costs of construction of a complete synfuels plant are so great (on the order of $1 billion) that private industry is very hesitant to undertake construction of a first commercial scale plant, regardless of the technology. There is technical risk in scaling up the technology to commercial plant size; inflation is a continuing threat; the government determination of and continuing commitment to a national fuel policy is uncertain; potential environmental requirements offer potential delays and court litigation; and the international supply and demand of conventional petroleum and possible price policies of the OPEC nations all compound the risk to a potential synthetic fuel producer.

The necessary government participation in the construction and operation of the first commercial scale synthetic fuel plants could take a variety of forms. The case of coal gasification is somewhat easier in that regard than that of coal liquefaction or shale oil extraction. Were the Federal Power Commission to approve surcharges or other cost-of-service rate increases which would permit gas companies to include the cost of plant construction in their rate bases, private industry probably would be less insistent upon other financial incentives of perhaps greater cost.

Shale oil extraction will require greater government commitment. The principal problems are resolution of the environmental impact delays and easing of the financial risks, particularly of construction, through one or more incentives.

The situation with coal liquefaction is still more difficult, since it appears at this time the cost of a barrel of syncrude would be substantially greater than the current (July 1975) cost of an imported barrel of OPEC oil. The liquefaction technology is far more uncertain than is the gasification of coal or the extraction of oil from shale.

Insofar as possible government incentives are concerned which would help reduce the risk seen by the private companies in the development of the first commercial scale synthetic fuel plants, it is apparent that the OCR two-thirds pilot plant and one-half demonstration plant grants are only marginally attractive. The convertible grant is considerably more popular in that it might offer a greater percentage coverage

and might extend to the construction of the first commercial scale plant. Patent right restrictions are a problem with all these three incentives, particularly with the convertible grant, which is considered to be unsatisfactory insofar as background rights are concerned.

Of the 9 incentives discussed with the 16 companies, the most attractive package would be a combination of the 90 percent loan guarantee and the guaranteed purchase on a CPFF basis. It would still be necessary, however, to resolve the so-called "crucial roadblocks" identified in Phase II,[7] especially in the inclusion of the cost of capital as a direct charge, resolution of patent right problems, and clarification of environmental aspects.

The almost universally popular incentive would be 100 percent government financing of the first commercial synfuel plants, following the World War II precedent of the synthetic rubber industry (Phase I Incentive 7). Once a successfully operating commercial scale synfuel plant is demonstrated, associated costs can then be identified and private industry would probably be willing to proceed with subsequent commercial scale plants on their own initiative and financing, or with more limited government incentives.

Probably the second most popular incentive, which also was not included in the incentive list discussed with the 16 companies, would be a government-sponsored all-risk insurance program. This program would also probably be least costly to the government in that the risks would not be exhorbitant and the associated cost would be low to the government.

The effect of both the insurance and the 100 percent financing incentives would be virtually to eliminate all risk to potential synfuels developing companies.

The combination of the 90 percent loan guarantee and guaranteed purchase (CPFF) would be almost as effective.

Since the commercialization of synthetic fuels is not popular with the oil industry, and is a course to which even the gas companies are disinclined except for the need occasioned by their dwindling reserves, IPMC suggests that the government should consider offering one or more of these three recommended incentives it it wishes to develop

---

[7] Loc. cit.

synthetic fuel at an early date; namely, 100 percent grants a la World War II synthetic rubber plants; an all-risk government insurance program; or the combination of the 90 percent loan guarantee and guaranteed purchase (CPFF).

II. INDUSTRY COMMENTS

The conclusions and recommendations of the preceding Executive Summary were derived by analysis of the individual trip reports prepared for and reviewed by each of the 16 companies interviewed. In order that the reader of that summary may have a better understanding of that background material, this present section presents actual comments made by the company representatives during the course of the various interviews. The comments have been edited to remove any indication of the particular source and, of course, have also been reviewed by the companies as part of their approval of their particular trip reports.

Four companies authorized disclosure of their comments directly to FEA. These were: Ashland Oil, Commonwealth Edison, Marathon Oil, and The Oil Shale Corporation. It was decided, however, not to forward that material to FEA because to do so would permit identification of others who preferred to remain anonymous by the simple process of eliminating the attributable statements from the comments of this section.

The following comments have been grouped in four principal categories: (A) Specific Comments on Incentives, (B) Specific Comments on Hypothetical Terms and Conditions and Suggestions for Changes in the Incentives, (C) General Comments on Incentives, and (D) Miscellaneous Comments.

In the first two categories, the comments were further subdivided by industry and technology. Specifically, the industries were: Gas Companies, Oil Companies, Utilities, and Others. The technologies were: high and low BTU coal gasification, and extraction of oil from shale. No relevant comments specifically pertaining to coal liquefaction were gained during the course of the interviews, and, therefore, that technology is omitted.

Attempts have been made to use the precise wording for each comment as approved by the various companies as part of their review of IPMC's internal trip reports. The comments, without attribution, are presented in Sections A and B in the same order as the related incentives were discussed in the course of the interviews. Thus, in each

classification by industry, comments for that particular category are first presented for Incentive 1, then for Incentive 2, and so forth.

The two exceptions to this organization are Sections C and D, "General Comments on Incentives" and "Miscellaneous Comments." In both those cases, the comments went beyond the nine particular incentives discussed. Comments in those two sections, however, are still grouped in subsets by industry.

Careful study of these comments will support the conclusions and recommendations presented in the foregoing Executive Summary.

A. Specific Comments on Incentives

1. Gas Companies

a. High BTU Coal Gasification

Incentive 1. Direct Grant (2/3--1/3) for Pilot Plant

We are interested in this incentive as a member of a consortium or future consortiums. We are not large enough to consider costly piloting of experimental processes alone.

We are presently active in the AGA/OCR joint program for high BTU production. The program is an example that the enormous cost can be met only by a consortium. Now in its fourth year, this effort is working well.

Incentive 2. Direct Grant (1/2--1/2) for Demonstration Plant

We do not believe that this would be an attractive or appropriate incentive for a regulated industry. It was pointed out that under FPC regulations a natural gas company cannot earn more than a reasonable rate of return on its plant investment. Since a pipeline company has no opportunity to earn an unusual return, obviously it cannot assume unusual risks in connection with the implementation of coal gasification projects. A regulated return requires the commensurate regulatory assurance of recovery of reasonable and prudent costs.

Incentive 3. Convertible Grant

See comment under Incentive 2 above.

There is no substantial advantage for us in this.

This is our preferred option.

Incentive 4. Loan Guarantee

This is a possibility, but is less desirable than specific government undertakings designed to meet particular identifiable risks.

Because of the limits on debt that can be issued by utilities, even government guaranteed loans for projects of the magnitude of a demonstration coal gasification plant are not necessarily a significant help. In some cases the guaranteed loan could not be issued without violating indenture or mortgage provisions. It is unlikely that adequate equity can be raised to maintain the appropriate debt-equity balance.

This is of significant interest. Such a guarantee as outlined is mandatory for a company to commit to first generation high BTU gas production.

We consider this to be a viable and necessary incentive. We do not believe that the massive financing necessary for the implementation of coal gasification projects can be obtained without this type of government assistance.

Incentive 5. Guaranteed Procurement/Fixed Price

We do not believe that this incentive would be workable for the regulated gas industry. A fixed price at a level high enough to compensate a regulated utility for the completion and operational risks of a coal gasification plant in all probability would be deemed to constitute an unreasonably high rate of return by regulatory authorities.

This is unattractive in that we cannot afford to divert our capital under the bondable credit restrictions for such use.

This incentive is out; just no way, with or without escalators.

Incentive 6. Guaranteed Procurement/Cost Plus Fixed Fee

This incentive might be of interest to other companies, but not to us. We are not interested in operating a plant for a fee; we are in the gas business and earn money on our plant investment.

This incentive is substantially the same incentive usually provided to jurisdictional or regulated utilities by regulatory bodies. As a general rule, utility rates are fixed in a manner which permits the utility to recover its reasonable and prudent costs, plus a fixed fee, in the form of a reasonable return on its plant investment. It is this type of regulatory treatment which we believe we must have, plus government loan guarantees, in order to obtain the necessary financing for our proposed coal gasification plant.

Incentive 7. Guaranteed Price (and alternatives)

A loan guarantee program and FPC policy changes are more important than use of this incentive.

These incentives have little appeal. In particular, it is especially difficult to forecast plant costs and technology success in order to arrive at price estimates.

This is merely a variation of earlier incentives; we prefer the earlier statement and the higher guarantee levels.

Incentive 8. Limited Price and Loan Guarantee (and alternative)

See last comment under Incentive 7 above.

We cannot see an advantage here over price guarantee. First generation plants will never get off the ground with this limited price guarantee--certainly not coal gasification companies.

The advance payments clause of Incentive 8b is attractive. The capital tied up in the venture must show some form of return over the period involved.

Incentive 9. Sale of Options/Guaranteed Price

This is a minor variation of the guaranteed price option. It is a syncrude option and really does not apply to the gas industry. It therefore would have essentially no probability of success for the industry.

This does not apply to the gas industry at all. It is really a shale oil incentive.

This seems to apply chiefly to liquid fuels. Who in this country is so interested that they would pay for an option for first generation plants? No guarantee of plant cost is indicated here. The first generation plant is the crux of the matter. Gas is selling into a dedicated market; liquid is not. An option serves no purpose a guaranteed price wouldn't.

A. Specific Comments on Incentives

1. Gas Companies

b. Low BTU Coal Gasification

Incentive 1. Direct Grant (2/3--1/3) for Pilot Plant

See first comment under Incentive 1 for high BTU coal gasification.

Incentive 3. Convertible Grant

There is no substantial advantage for us in this.

Some type of adaptation of this could be useful in providing construction funds; as indicated earlier, a direct government loan for the interim period might likewise be necessary to do the job.

Incentive 4. Loan Guarantee

Some adaptation of this incentive or government risk insurance is probably going to be essential.

This would be an attractive incentive. We do not want a large equity investment. We would welcome this incentive.

Incentive 5. Guaranteed Procurement/Fixed Price

We couldn't live with this. It just wouldn't work.

There is no question that domestic energy prices need to be maintained at reasonably high levels in order to allow synthetic fuels to be competitive.

Incentive 6. Guaranteed Procurement/Cost Plus Fixed Fee

See second comment under Incentive 5 above.

Incentive 7. Guaranteed Price (and alternatives)

These provisions are not clear enough for consideration.

With respect to low BTU this is the best incentive to accelerate a program. We feel low BTU has as much merit as high BTU. Prospective industrial customers would be most interested in committing to purchase low BTU gas if assured of some future price protection. A sales contract guaranteeing price protection to the plant for a period of 15 years and providing for increases in cost of coal, labor and other costs is required for financing. The risk would be too great for the gas buyer to purchase, however, without reasonable assurance of price protection.

Guaranteed price--or price subsidy--would accelerate low BTU development.

Incentive 7b could be useful for very large low BTU plants.

Incentive 8. Limited Price (and alternative)

See second comment under Incentive 8 for high BTU coal gasification.

Incentive 9. Sale of Options/Guaranteed Price

See third comment under Incentive 9 for high BTU coal gasification.

A. Specific Comments on Incentives

2. Oil Companies

a. High and Low BTU Coal Gasification

Incentive 1. Direct Grant (2/3--1/3) for Pilot Plant

We particularly agree with the Industry Team that direct grants for pilot plant construction are one of the most attractive of any of the incentives.

Incentive 2. Direct Grant (1/2--1/2) for Demonstration Plant

Though this incentive is referred to as a "grant," this is a misnomer inasmuch as reimbursement of the government's costs is provided for through the sale of processes and products from the plant. A demonstration plant as such, based upon the definition, is not and cannot be viewed as a commercial plant. There are marked differences.

Incentive 4. Loan Guarantee

Because of the front-end expenditures required, a loan guarantee is not, by itself, enough. The technologies now available are completely of a first-generation nature. Technological variation from this point on could conceivably make us non-competitive.

Incentives 7a and 7b. Guaranteed Price and Guaranteed Price with Loan Guarantee

The basic concepts of the combined incentive would be the most appealing--guaranteed price during commercial production with advance payments or possibly loan guarantees for assistance in initial funding of the project. As we understand the guaranteed price concept of these two incentives, the contractor could be assured of a minimum price when commercial production is attained and share with government any excess over the minimum. Losses experienced by the government through the guarantee could be offset by application of funds received when price is in excess of the minimum. Advance payments to the contractor would provide the financing necessary to undertake the

project. However, since the supplemental data furnished indicate that the hypothetical terms and conditions of Incentive 5 apply to these incentives, we are not certain which portions would be applicable. Further analysis and clarification is required.

Incentives 7c and 7d. Guaranteed Price--Alternative and Guaranteed Price--Alternative with Loan Guarantee

With respect to these two incentives, the price support is funded where the market price is less than the contract price by assessing all U.S. refiners the difference on the basis of their refinery runs for the month. If the contract price is less than the market price, credits are given to such U.S. refiners. This incentive could very well result in a subsidization of synthetic fuel production by a conventional refiner, irrespective of whether or not a particular refiner is engaged in synthetic fuel production or refining. We believe that such a subsidization program would not be warranted on any basis and is akin to the current "Entitlements Program" concerning the right to refine "old oil." If other adequate incentives are provided for synthetics, there would be no need to burden and restrict conventional production with price supports which could result in restricting the maintenance of conventional production.

Incentive 8a. Limited Price and Loan Guarantee

This is not an appealing incentive.

Incentive 8b. Limited Price Guarantee/Advance Payment

The advance payments provision represents an advantage, but it is insufficient. The risk is so great that this incentive could not be considered. Again, we have difficulty in applying the hypothetical terms and conditions of Incentive 5 here.

Incentive 9. Sale of Options/Guaranteed Price

More than one variable in the bidding would make evaluation of the bids by government difficult. This assumes that the technology is complete and there is capacity enough to adapt to a flexible future. No experienced supplier will gamble on completion of the plant in five

years. This time frame would be impossible for most. It requires never less than four years to complete a syncrude plant; the five-year basis cuts it too close; the schedule here is totally unrealistic. There are too many factors beyond control in the schedule, environmental objections among others, to make it feasible before plants are in being and production proven.