

The original documents are located in Box 36, folder “Uranium Enrichment (2)” of the James M. Cannon Files at the Gerald R. Ford Presidential Library.

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[May 1975]

1) Negotiate w/ UEA
on Real needs.

2) ~~Conquering agreement~~
~~to discuss informally~~
~~with the Committee on~~
~~Atomic~~



[May 1975]

The following is a brief description of how uranium is processed for use by utilities in their reactors.

Uranium "rocks" are mined by companies such as Anaconda Copper and processed into "yellow cake" which is a powder-like substance. This is purchased (for around \$10-15) by the utilities and sent to a chemical company where it is converted into uranium hexafluoride. This gaseous substance is then sent to an ERDA enrichment plant.

The enriched uranium, which ^{has} ~~is~~ now doubled in value, is sent from the government plant to a fuel fabrication firm, such as General Electric or Exxon, where the gas is converted back into a solid (oxide) form. Here it is made into "fuel elements" and packaged for use in the reactors. The uranium then goes directly from the fuel fabrication firm to the utility for use in the reactors. After its use as a reactor fuel, it is sent to a chemical processor for recycling or to be prepared for disposal.



[May 1975]

Why did UEA decide that diffusion is the right technology?

1. Proven technology, now used in 3 ERDA-owned plants. No question as to its workability. Centrifuge has yet to be demonstrated on commercial scale. Diffusion is known to be reliable. Manufacturers of centrifuge unable to guarantee units.
2. Demonstrated technology and reliability is necessary to get financial backing and customers (utilities).
3. Capital costs roughly a standoff between diffusion and centrifuge.
4. Electricity requirements (about 15% of diffusion) for centrifuge is a benefit but this is offset by:
 - . Replacement and maintenance costs which are unknown for centrifuge but well known for diffusion.
 - . Higher labor costs.
 - . Higher equity required for centrifuge because it is unproven technology. High debt-low equity planned for diffusion is a benefit to utility customers-- because they can write off interest on debt. Result is to hold down price per separative work unit (SWU).

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ADDITIONAL

URANIUM

ENRICHMENT

CAPACITY

FOR THE

1980's AND

BEYOND



May 2, 1975

BACKGROUND

- USG now sole supplier in U. S.

- USG capacity fully committed

- Foreign competition increasing

- Long construction lead times (8-10 yrs.)

- \$3-4 billion per full-size plant

- History of indecision

DEMAND PICTURE

- Total estimated market

1985 - 9 M

(100)

1987 -19 M

1990 -38 M

- Domestic market diminished
- Foreign market data uncertain
- Indicates need for flexibility in adding incremental capacity

ALTERNATIVE TECHNOLOGIES

- Gaseous Diffusion

-- 30 years old, but proven

- Gas Centrifuge

-- new, untried at commercial size

-- less power to operate

-- smaller economic size

-- greater opportunity for future efficiencies

Basic Options

UEA Plan -- 9 M SWU GD plant - 1983

ERDA Plan --

- Commit now to a 5 M SWU
USG "add-on" plant - 1984

- Encourage maximum private
entry in centrifuge
 - Garrett, EXXON, CENTAR

 - 3-5 M SWU - 1986

- Determine final size of add-on
GDP in one year

UEA - CENTAR COMPARISON

	<u>UEA</u>	<u>CENTAR</u>
Capitalization	60% foreign	100% domestic
Equity	15%	25%
Loan guarantees	life	refinance
Commercial delivery	early 1980's	from start
Equity bailout	"fair compensation"	walk away
Minimum Starting Capacity	75%	30%
Defaulting Utility Oblig.	Yes - NTE half of domestic sign-up	Not requested
Completion/Performance guarantees	Yes	Yes

Comparative Analysis -- UEA vs. ERDA Plans

-- Meeting demand

- UEA -- virtually certain
- ERDA -- could fail to exceed 5 M SWUs

-- Decisive action

- UEA -- sole source, hard to sell
 - 8-12 mos negot. leadtime
- ERDA -- Gov't. "add-on" GDP should sell
 - private entry less controversial than UEA

-- Encourage private entry

- UEA -- results in single supplier only
- ERDA -- results in competitive centrifuge industry

-- Flexibility of Capacity increments

- UEA -- No
- ERDA -- Yes

-- Net budget impact

- UEA -- None
- ERDA -- probably less than \$100 M net
 - less guarantee exposure, slightly higher risk
 - no demonstration cost

RECOMMENDATION

- Adopt ERDA approach
 - UEA as a sole source hard to justify
 - more decisive, less controversial than UEA
 - buys a better result -- competitive private entry
 - Disadvantages acceptable
 - minimal net impact on budget
 - technical risk commercially acceptable

Next Steps

- Obtain authorization for add-on GDP
- Release centrifuge RFPs for early response
- Legislation to establish commercial price
- Announce open season

1) Glen Schlerke

May 15, 1975

2) Cannon - File

M E M O R A N D U M

TO: Vice President Nelson Rockefeller

FROM: Edward Teller E.T.

SUBJECT: Rapid Development of In Situ Technologies



INTRODUCTION

The exploitation of fossil fuels which are not close to the surface may be carried out by in situ processes. These have the advantages of possible early availability, moderate ultimate cost, ample resources and limited interference with the environment. Once developed, these technologies can provide gas and liquid fuels to meet the nation's need for more than a century.

In a financial sense, the government has a large stake in the synthetic fuel industry. Especially in the case of shale, the most potentially profitable sites are on land owned by the government. The government has an obligation to the public to determine the true worth of that land before leasing starts and to obtain a just return on the value of that land.

To develop these technologies will require a large program of research and development. At the present time, very little is being done and there is a good reason why not. Private industry is great at research that has a payoff within three years; government research is successful when the industrial payoff is in twenty years. In between is no-man's land, not well suited to either.

Presently, industry sees little incentive to pursue the technology since the risks are considered high and alternative investments (e.g.,

in oil) seem attractive. Therefore, I propose that the government take steps simultaneously to stimulate efforts by industry and also by government to pursue the needed research itself, perhaps through the Energy Research and Development Administration (ERDA). In government laboratories research for a longer period may be planned. For industry, research-work of shorter duration seems appropriate.

In the following, we will outline a possible approach that would result in understanding the technology in five to seven years, and production of a million barrels per day five years later. Equivalent amounts of energy can be available from in situ coal gasification on the same time scale. But to achieve these levels of production on this time scale, significant efforts must be initiated now.

There are three different in situ processes to be considered: extraction of oil from oil shale, production of high Btu gas from coal occurring in thick seams, and the production of low BTU gas from coal occurring in thin seams. The first two topics have many points of similarity and will be treated conjointly in the following. In all cases, some research has to precede large scale production. This research can be carried out in government laboratories or by private enterprise at government expense. It will be recommended that both paths be pursued in order to ensure early and relevant results. It may be preferable to concentrate on one or the other approach. In any case, research by government and private enterprise should be started at the earliest possible date and any delay of one should not cause delay in the other.



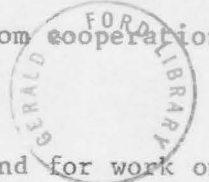
Phase I - R&D

Initial efforts will focus on fundamental research in the laboratory coupled with testing in the field. The goal is to understand and to learn how to control the process. During this phase, demonstration plants capable of producing at least 5 thousand barrels per day (or equivalent gas from coal) will be developed.

The research program for oil shale and for high Btu gasification could be effected either by the government alone, or with the participation of industry. I recommend that we initiate a program in two parts, exploiting the maximum contribution from both sources. One part would be an effort by the government labs funded through ERDA. A parallel program would involve industries which may be funded by an appropriate finance corporation. This dual effort would reap benefits both from cooperation and from competition between the several participants.

The specifics of the proposal for work on oil shale and for work on high Btu gas are as follows:

- Provide \$100 million for oil shale and \$100 million for high Btu gas to perform the research through the national laboratories. This part of the program would take five to seven years to complete and would carry the research through the commercial-size 5,000 to 50,000 barrels per day operation.
- Provide \$150 million for oil shale and the same amount for high Btu gas that might be divided among three companies (about \$50 million each). This money would be spent over a three year period to perform the research independently of each other. Following



the first three years, additional funding would be available at a level of up to \$25 million per company per year to be matched by an equal amount of that company's funds. The matching funds would be required at this stage since much of the risk would have been overcome in the preceding years. Full deployment could begin after two to four years of this jointly funded research. In this phase altogether two to four companies would be involved. It would not necessarily be the case that the same company would be involved through all the R&D phase. Conceivably, one company could develop the technology and another could build and expand the pilot plant. Yet a third company could take over in Phase II (to be described below), where the commercial operation will take place.

Making industry a part of the R&D effort would provide the opportunity to exploit several processes in several types of locations and would provide for healthy competition between different techniques. Work by government laboratories is essential to ensure the technical depth required to establish the technology in a minimum amount of time and to provide continuity throughout the entire research phase. There should be cooperative interaction between the government and industrial research programs to resolve any different findings that may occur. This plan provides the opportunity to transfer laboratory technology to industry and the government labs can certainly help in solving some problems that will be encountered by the industries.

Phase II - Expansion to 1 Million Barrels Per Day

Following the research and development phase the technology will have been established. The next step is for companies to create a new industry based upon that technology. At the same time, means to making capital available to the companies may be needed. Although the process will be known to the industries involved, it will still be unproven to the traditional lending agencies. A government financing corporation could meet this need.

To deploy these technologies, several different types of financing are possible:

1. The companies could construct the plants with government funds, then after the operation is established the companies could buy the plants. The synthetic rubber industry was financed in this way during WW II.
2. Companies could simply borrow money from a finance corporation at some low interest rate such as 4%. This would certainly provide an incentive.
3. Companies could lease the land at a low price as an inducement for them to enter the industry. They would then pay a rather high fixed rent on that land as an inducement to maximize the rate of production at an early time. This kind of approach would stimulate risk-taking by the companies.

The above three approaches are, of course, not mutually exclusive.

Low BTU gasification using less thick coal seams is a special case.

The process has already been partially established, by research in the USSR and to some extent in the United States. The gas would be of poorer quality and can be transported economically only a short distance. Needed additional R&D effort can be of shorter duration and would require less funding. A specific proposal would be to:

- Allocate \$5 million per year to government laboratories, possibly three of them, including the U.S. Geological Survey and one or more state agencies. The research should be planned for three years.
- Make available \$5 million to each of three companies for a one-year period to establish pilot facilities. This would be followed by \$10 million to one or two companies for two additional years, to be supplemented by matching company funds. Expansion beyond this point would be the same as for oil shale and high Btu gasification.

Industrial participation in all three cases (oil shale, high Btu gas, and low Btu gas) would come primarily from oil, gas, and coal companies but need not be limited to these.

Further Comments

Oil Shale: The process consists in rubblizing the shale in place and using the earth in a manner similar to that of man-made retorts.

Industry participation in the research should be encouraged. This is essential for the early acceptance of the technical results by industry. The stack gas scrubber technology development is a prime example of the

delays that are likely to occur when one group develops a technology in isolation from those who will have to use it. How to use the results and the cost of the process can only be understood when the user has considerable experience with the process.

Another step involves paving the way for final acceptance of the large scale development of oil shale. Although the environmental impact of in situ extraction is much less than for surface plants, there will still be some effects. A program should be undertaken, probably not in ERDA but rather in EPA, to determine how to handle that impact in an acceptable manner. This work, too, would have to be performed in close cooperation with the government research program, with participating companies, and with the communities that would subsequently be affected.

Most, if not all, of the suitable oil shale land is owned by the federal government. Suitable sites will have to be made available free of charge for each of the research programs.

Coal Gasification and Liquefaction: The goal for high Btu gas is to provide energy at a cost less than \$1.00 per million Btu.

For low Btu gas, the goal is to provide the energy at a cost between \$1.00 and \$1.50 per million Btu. The low Btu gas will be used near the location of its source and there will be no large transportation costs involved. The two alternatives for in situ coal gasification are the following:

- To obtain high Btu gas one would exploit the deep thick Western deposits of coal. Because of the long distance to major markets

and the cost of pipelines there is a premium on a high Btu gas for distant users. The coal would be rubblized and then gasified by burning in oxygen and in the presence of high pressure steam. The product can be turned into pipeline quality gas by simple processes carried out on the surface.

- To obtain low Btu gas one would utilize more widely distributed coal deposits which occur in less thick seams. These occur particularly in the industrialized east and mid-west. There, the premium on high Btu gas is not as great because gasification can be done close enough to points of consumption so that the pipeline costs are not significant.

Whereas there are currently no efforts to produce high Btu gas in situ by industry, there are already a number of industrial and government low Btu gasification projects. Therefore, the more modest expenditures proposed above may suffice.



PROPOSED GOVERNMENT RESEARCH EXPENDITURES

PROGRAM	COST (Million \$)	REMARKS
Oil Shale		
Government Labs	100	Spent over 5-7 years
Industry (First 3 years)	150	Approximately \$50 million to each of three companies
Industry (following period not exceeding 4 years)	100-200	One or two companies at \$25 years/company matched by company funds.
Coal Gasification (High BTU)		
Government Labs	100	Spent over 5-7 years
Industry (First 3 years)	150	Approximately \$50 million to each of three companies
Industry (Following period not exceeding 4 years)	100-200	One or two companies at \$25 year/company matched by company funds
Coal Gasification (Low BTU)		
Government Labs	45	\$5 million/year at each of three labs for three years
Industry (First year)	15	Three companies at \$5 million/year
Industry (Following 2 years)	20-40	One or two companies at \$10 million/year/company
TOTAL COST	780-1000	

Present estimates of the capital required to expand these industries to production level of a million barrels per day or its equivalent in gas are:

Oil Shale	\$ 6 billion
High BTU Gas	7 "
Low BTU Gas	5 "
TOTAL	\$ 18 billion

THE WHITE HOUSE

WASHINGTON

May 20, 1975



MEMORANDUM FOR: JIM CANNON
FROM: GLENN SCHLEEDE
SUBJECT: RESPONSES TO YOUR QUESTIONS
RELATING TO URANIUM ENRICHMENT

This is in response to your questions concerning ownership of UEA and heavy water as it relates to Dr. Teller's comments:

1. Uranium Enrichment Associates (UEA) was initially formed in about 1972 as a consortium for the purpose of doing a study to see whether private industry involvement in enriching uranium was a good idea. Three firms each contributed \$1 million: Bechtel, Westinghouse and Union Carbide. Carbide operates 2 enrichment plants now. The Japanese Government approached UEA and asked to participate in the venture. The partners agreed, with AEC's approval. The Japanese contribution was \$3 million. None of the partners was committed to anything more than the study phase. Westinghouse and Carbide decided to drop out at the end of the study. The Japanese received those portions of the study that could be released (i.e., minus certain classified portions) and the arrangement was completed.

Bechtel has now been joined in UEA by Goodyear (which company operates the third ERDA-owned diffusion plant). About \$2.5 million has been spent since completion of the UEA study, most of it from Bechtel's funds. If the venture proceeds, Bechtel expects to add 3 to 5 more partners from U.S. industry. The expectation is that UEA partners will then put up 40% of the equity (financing for the venture is planned as 15% equity and 85% debt), and control 55% of the voting stock. UEA expects to get 60% of the equity from foreign partners who will control only 45% of the voting stock.

Foreign partners are expected to consist of customers and/or equity holders. For example, Iran has offered to buy 20% of the product of the plant and take 20% of equity and 20% of the debt. Other potential foreign customers include Japan, Germany, France, Spain, Taiwan. Venezuela may participate in financing but not product.

2. Dr. Teller and Heavy Water

This is a puzzle. I can understand why Dr. Teller would be pushing the new enrichment concept of laser isotope separation (LIS) which is under development at Livermore and Los Alamos -- but can't understand why he would be pushing heavy water.

- . Heavy Water refers to the moderating fluid used in a particular kind of nuclear reactor. The heavy water concept was explored by several industrial nations, including the U.S., and was rejected by all except Canada. The heavy water reactor uses natural uranium (i.e., .7% U-235) rather than enriched uranium which is used in all other reactors. For example, the light water reactors which now dominate U.S. markets require enriched uranium with 3% U-235.

Canada selected the heavy water reactor (marketed as CANDU) largely because Canada has large quantities of uranium. Other countries decided it was too inefficient. Canada has succeeded in selling some CANDU's to India but has not had great success elsewhere in the world market.

- . Livermore and Los Alamos have been working on the use of lasers to separate out the U-235 atoms from natural uranium. The process is still in the development stage. If it works it will be much, much cheaper than either the centrifuge process or the existing diffusion process. Right now there are at least as many people betting it won't work as those betting for it. In any case, LIS is not likely to be ready in time for the next 3 or 4 plants.

I hope the above helps. If not, I'll be pleased to try for more.

cc: Mike Duval





UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
WASHINGTON, D.C. 20545

OFFICE OF THE ADMINISTRATOR

May 21, 1975

NOTE FOR: James Cannon, Director
Domestic Council

Jim:

Attached is ERDA's Summary Report on
UEA's Request for Government Assistance.
It was part of our memorandum to
Jim Lynn on April 1.

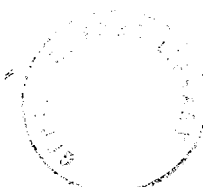
The budgetary impact of UEA is outlined
on page 7, section III.

I'll be glad to discuss this with you
further.


Bob Fri

Deputy Administrator

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Attachment



SUMMARY REPORT

UEA REQUEST FOR GOVERNMENT ASSISTANCE



I. Introduction

Uranium Enrichment Associates (UEA) for nearly two years has actively sought to establish a project for a large gaseous diffusion uranium enrichment plant. It has made substantial progress in establishing the technical basis for the project and has conducted extensive marketing activities with prospective domestic and foreign customers. A project financing structure (Figure 1) has been developed conceptually and employed as a basis for the UEA marketing efforts. It has been determined by UEA and its financial advisors (Salomon Brothers) that, due to the unique nature of the project (secret process, no commercial history, very large capital requirements), it cannot be financed and operated commercially without certain forms of Government assistance and assurance.

The Project Board - Private Uranium Enrichment, through extensive discussions with UEA and others, has evaluated the types of assistance requested and the likely (and maximum theoretical) obligation that could result to the Government. It is accepted by UEA that costs incurred by the Government in providing the requested assistance would be repaid by UEA, except in one case in which the Government might acquire a salable asset. This brief summary provides highlights of the Board's evaluation of each requested area of assistance. UEA has stated that there may be alternative ways in which the objective of commercial project financing can be achieved and that its positions, as expressed to the Board, are open to further discussion. The Board, however, has been obliged to evaluate UEA's expressed positions as to the Government assistance required to insure project viability.

In addition to evaluation of the assistance requested from the Government, the Board considered other key aspects of the project including: prospects for domestic equity partners, anti-trust review considerations, other regulatory considerations, market prospects both domestic and foreign, project financial structure and the conceptual financing plan which is based upon the assumed type of Government assistance, alternative ways of resolving some of the problems which are raised, project power supply, project completion schedule and time schedule for obtaining the necessary legislative authority. Board review and discussion of these items is contained in its final draft report.

FIGURE 1

CONCEPTUAL FINANCIAL STRUCTURE
(ASSUMES \$5 BILLION PROJECT COST)



DOMESTIC 40 PERCENT

- TOTAL SHARE - \$2 BILLION
- 15 PERCENT EQUITY - \$0.3 BILLION
 - 4-8 U.S. COMPANIES
 - SWU PRICE STIPULATES MINIMUM 15 PERCENT NET RETURN
- 85 PERCENT DEBT - \$1.7 BILLION
 - DEBT SECURITY
 - LONG-TERM CONTRACTS
 - GOVERNMENT ASSISTANCE PACKAGE
 - SWU PRICE REFLECTS COST OF DEBT, EQUITY AND GOVERNMENT ASSISTANCE

FOREIGN 60 PERCENT

- TOTAL SHARE - \$3 BILLION
- 85 PERCENT DEBT, 15 PERCENT EQUITY
- THREE OR MORE FOREIGN PARTICIPANTS
- INDIVIDUAL CAPITAL PROVIDED:
 - FROM FOREIGN SOURCES
 - PROPORTIONAL TO OFFTAKE
 - THROUGH IRREVOCABLE "LETTER OF CREDIT" HELD IN U.S.
- SWU PRICE REFLECTS INDIVIDUAL SERVICING OF CAPITAL
- TOTAL FOREIGN VOTING RIGHTS
 - LIMITED TO 45 PERCENT
 - BALANCE OF EQUITY - "PREFERRED STOCK"

II. Requested Government Assistance

A. Performance Assurance

UEA seeks an adequate supply of specialized materials and components (e.g., barrier) now manufactured by ERDA plus Government technical expertise and assistance to assure that the technical basis of the project is sound and that obstacles can be overcome most effectively in order that the project will perform technically. Recognizing that this approach would, in effect, make the Government a technical partner in the undertaking, UEA is willing to accept whatever Government overview, including "veto power", is necessary to protect the Government's interest during design, construction and startup. The Board's best judgment of the cost of needed Government functions is \$150-\$200 million; this includes costs of a 100-man Government review team. It is assumed that Government costs would be reimbursed on a current basis during construction.

Problems of risks involve potential early authorization of additional Government barrier production capacity, ERDA scarce manpower allocations between CIP/CUP and the UEA project, Government liabilities under warranties for its products and the practical problems which could be created by dual project controls (increases in cost, schedule delays).

B. Completion Guarantee

1. Contingent Government Loan Guarantee

UEA seeks an arrangement which will assure its ability to borrow funds for the project. According to its concept, the chief condition to invoking the contingent loan guarantee would be an inability of UEA to market securities at an interest rate equivalent to an "A" bond rating or above. At that point the Government would back subsequent UEA securities through a loan guarantee during the construction period to assure their marketability. This would apply only to the domestic debt portion (85% of 40%) up to a project cost limit. This limit would be based upon a joint UEA/ERDA estimate of ultimate project cost, escalated in an agreed manner and with application of a contingency factor appropriate to the quality of the estimate, plus an additional overrun allowance. The loan guarantee would not apply to purely commercial debt already secured and all debts would be of equal stature. According to UEA, this feature is necessary to the financability of the project since it will assure UEA's ability to obtain sufficient funds to complete the plant (and thereby assure customers, PUC's and lenders of an operable plant). In concept it would also minimize the amount or duration of Government involvement in project financing. While there would be no direct cost to the Government (except in the event of default),



the loan guarantee feature may increase Government debt and might possibly impact the Federal debt ceiling.

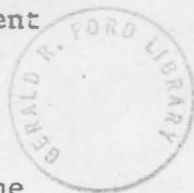
Problems or risks involve the following:

- The plan is preliminary and has not been reviewed by Salomon Brothers marketing staff or tested in the marketplace.
- The contingent loan guarantee may adversely influence (Treasury initial reaction) or improve (Salomon Brothers view) the availability of purely commercial debt. If the former, the Government runs the risk of guaranteeing most, if not all, domestic debt.
- Domestic utility rejection of UEA contracts, especially "hell or high water" provision, would erode basis for securing and servicing long-term debt. This could lead to Government guarantee of all domestic debt for the full 25 year term, if the project proceeded at all. (There is evidence that some may accept, others may reject, this provision.)
- The uncertainty of foreign participation up to the 60 percent target, and the potential inability of UEA to compensate with increased domestic capital, raises the potential Government liability, if the project proceeds.

2. Overrun Funding

UEA requests assurance of funding overruns, in the event the project cost limit is exceeded, by further Government guaranteed loans, or direct loans to be repaid by UEA, possibly after payment of private debt. UEA would undertake to match such funding with 15 percent equity funds on a "best efforts" basis. According to UEA, the overrun feature would assure its ability to obtain the large amounts of debt and equity capital required for the project which otherwise would be impossible since it will be necessary to employ a project cost estimate based only upon conceptual design. The costs of such assurance are probably zero if, as is likely, Government guaranteed loans would be involved, since in the absence of a condition of "economic frustration" (see below), one can safely assume that successful completion of the project is technically feasible. However, there is a potential budgetary impact of up to \$2 billion which represents a 40 percent overrun.

With respect to problems or risks, there is great doubt that open ended assumption of funding overruns by the Government probably would be approved by Congress. Even if overrun funding were tied to a limit, it would tend to reduce credibility of project estimate



limit to the Congress and endanger approval. UEA's lack of firm commitment to provide additional equity in the event of overruns to maintain 85 percent debt/15 percent equity ratio may be unacceptable to Congress and it eliminates a risk incentive to UEA for efficient management and control of costs. There is some verbal evidence that UEA may be willing to make a stronger commitment in this area than it has so far made to the Board.

3. Economic Frustration

UEA requests Government assurance against risk of "economic frustration" of the project, i.e., unacceptable postponement of return on, or recovery of, equity due to (1) completion of plant delayed beyond some agreed relatively late date, (2) prohibition or indefinite suspension of construction or operation by judicial or administrative action or (3) other causes which effectively prevent economic realization of the project, such as inability to obtain power. In such event, the Government would assume U.S. debt and provide "fair compensation" to U.S. equity investors and would assume control of the project in order to bring it to a successful conclusion. According to UEA, they might not be able to obtain necessary debt-equity capital in the face of such risk without this assurance. The costs to the Government could range up to all domestic capital, i.e., 40 percent of the project costs.

With respect to problems or risks, in the event of "economic frustration" due only to unacceptable delay in completion of the project, U.S. could then become an equity partner with other foreign equity partners, thereby possibly presenting political problems in the administration of the project. There exists a potential Government liability for all domestic capital with a risk of not having an operable plant, although with Government's participation in key phases of the project such risk appears remote. The concept may present difficulty in negotiation of mutually acceptable criteria for "economic frustration" and "fair compensation". Non-assumption by equity capital of the risk of economic frustration would imperil Congressional approval, remove a risk incentive to UEA for efficient management and create a significant precedent regarding Government assistance.

C. Stockpile Backup and Load Leveling

UEA requests access to the Government SWU stockpile, on a lease or purchase basis, for up to two million SWU's over the first four years after startup, and nine million SWU's at the outset and decreasing to zero five years after the plant achieves "successful" operation.

Additionally, ERDA is requested to agree to purchase up to a total of six million SWU's (UEA estimates four million most likely) during the first five-year operational phase of the plant. The amount would be agreed five years in advance of the proposed first delivery. Prior to firm-up, UEA would attempt to sell the excess to others. These features will permit UEA customer contract needs to be met in the event of startup delays or interruptions and will levelize the commitments on the plant due to irregular early customer demand prior to achieving a steady-state operation. If the ERDA purchase obligation were four million SWU's, and on a time schedule presently viewed as most likely, cost to the Government could be \$300-\$500 million. In a time frame that would require Government feed purchases, this could rise to \$600-\$1400 million. This asset should, however, be resalable.

Problems and risks in this area concern the expected adequacy of the Government SWU stockpile in relation to all anticipated needs and the probable need, in the late 1970's, to seek appropriations for purchase of SWU's and any needed feed. On the other hand, use of surplus Government feed in the UEA plant, if possible timewise, represents an opportunity to nearly double the amount of enriched uranium produced.

D. Termination of ERDA Contracts

UEA requests that ERDA terminate a sufficient number of its long-term enrichment services contracts with utilities to assure that the UEA plant would be effectively sold out - on the assumption that terminated customers would then sign with UEA. The Government has already agreed that it would honor voluntary requests for termination. Involuntary termination requires that certain criteria be met. However, on the assumption that the criteria to allow the necessary terminations would be met, there would be no cost to the Government since operating conditions in Government plants would be adjusted to compensate.

Problems and risks relate to domestic requests for voluntary termination being tied to the imposition of an ERDA commercial SWU price, to doubts as to whether involuntarily terminated customers would sign with UEA, and to possible need to make a formal "reasonableness" finding concerning UEA contract terms and conditions. Further, termination of ERDA contracts beyond a certain point would result in uneconomic costs to remaining ERDA customers.

E. Defaulting Utility Protection

UEA requests that, in the event of a default by a domestic utility and inability of UEA to sell the services to others, the Government assume the obligations of the defaulting utility up to a limit of 50 percent of the domestic utility share of plant output. ERDA's

obligation would terminate when a substitute customer is found or their long-term debt retired, whichever is earlier. Any amounts recovered from defaulted utilities would accrue to ERDA. UEA's objective is to protect the debt and equity investors by assuring revenues to cover operating costs, debt requirements, and a 15 percent net return on equity. Assumption of obligations by ERDA overcomes the utilities' refusal, because of legal and financial reasons, to accept increases in costs caused by a utility defaulting its obligations (cross-guarantee of another utility). The potential cost to ERDA (assuming \$100/SWU plus feed) for each large reactor of a defaulting utility could be in the order of \$20 million a year or \$500 million over the maximum 25-year period. Maximum exposure for 50 percent of the domestic utility share of the project would be about \$360 million a year or \$ 9 billion over the 25-year period. Also, ERDA would be required to maintain a contingency stockpile of feed material as insurance even if no utilities default.

With respect to problems and risks, it is not apparent that a "cross-guarantee" by ERDA is necessary because the potential risk, although large, is not likely to materialize as (1) the utility industry is not apt to crumble, (2) the reactor would likely still need fuel (even if the utility were bankrupt), and (3) there is a growing demand for power which would suggest that enriching services could be marketed elsewhere. It would appear that assumption of the obligations of defaulting utilities places risks on ERDA which could and should be assumed by the UEA equity investors and/or UEA customers, especially in view of the low probability of there being a problem in this area.

III. Government Assistance Budget Impact

The summary shown in Figure 2 is the Board's collective judgment regarding the likely impact of those elements of Government assistance which UEA feels are necessary to insure project viability.

FIGURE 2

	<u>GOVERNMENT ASSISTANCE BUDGET IMPACT</u>		
	(\$ Millions)		
	<u>Most Likely</u>	<u>Potential Maximum</u>	
A. Performance Assurance	150-200	150-400	Reimbursable, generally current basis
B. Completion Guarantee	0	0-2000	Probably recoverable, economic frustration remote
C. Stockpile Backup - Load Leveling	300-500 (no feed)	600-1400	Purchased SWU's represent a resalable asset
D. Termination of ERDA Contracts	0	0	Operating conditions adjusted
E. Defaulting Utility Protection	0-40 (1 contract for 2 years)	0-9000	Potential maximum obligation if 1/2 of all domestic customers default for full 25-year period

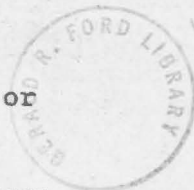
MARKET ASSESSMENT

DOMESTIC

- Demand is consistent with the 40 percent of plant output target assumed by UEA.
- Four "Letters of Intent to contract" have been received from domestic utilities; three-four more expected shortly, with all "intent" letters expected to total about 1.2 million SWU's/year.
- Remaining utility commitments probably dependant upon utility views of UEA contract (presently not positive).
- However, if Government support to the project is given, domestic customers are likely to follow.

FOREIGN

- Iran - Commitment likely for up to 30 percent of plant output or such less percent as U.S. Government policy may allow.
- Japan - Commitment of 22 percent of plant output probable if there is strong U.S. utility or Government support to the project.
- France - Commitment of 11 percent spoken of, but may well be contingent upon technology sharing and reciprocal ownership arrangement with EURODIF, thus highly questionable.
- West Germany- Commitment of 10 percent spoken of, but no solid information to assess probability.
- Others - Taiwan, Spain, Brazil, Australia possible; capital financing or other problems may be impediment.
- Conclusion - Given uncertainty of U.S. policy on allowable foreign participation, other foreign conditions, the timely firm achievement of the 60 percent target is doubtful thus jeopardizing timely achievement of "Go" decision (requires commitment to 75 percent of plant output).



- O'Neill
has a copy.

8/5/21

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

May 21, 1975

NOTE TO THE DIRECTOR - Per your Request

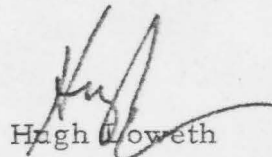
Attached is an outline of a possible statement on uranium enrichment by Secretary Kissinger at the May 27 IEA governing board meeting.

We understand Jim Cannon is personally completely reworking the Domestic Council cover memo to the President which is now virtually a decision memo on the basic issue of private entry.

We are supplying information to Cannon via Glenn Schleede to assist in his rewrite.

We understand Cannon is particularly concerned about the position Kissinger should take at the IEA and will mention this in the Presidential memo. Cannon is apparently trying--in his rewrite--to accommodate to NSC/State needs for early U. S. ability to accept foreign orders as well as pump for private entry (which may be hard to do).

Cannon plans personally to run his rewrite by you and Scowcroft by today (Wednesday) or early tomorrow.


Hugh Downs

Attachment





THE VICE PRESIDENT
WASHINGTON

May 23, 1975

Dear Mr. President:

I have discussed fully the proposals relating to enriched uranium with Jim Cannon.

While there are strong feelings on both the private and the public sides of this issue, in my judgment there should not be any conflict between them. It is terribly important that we pursue both approaches.

Our leadership in this field requires that both the government and the private sectors work together in the national interest on this important issue.

If the ultimate decision should be to create something like the energy financing group, it would provide the vehicle for either the government approach or the private approach, or both -- without having to go back to the Congress for funds. Indeed, in my judgment I don't see how the capital can be raised for either approach unless there is a vehicle such as the proposed financing group.

Sincerely,

The President
The White House

NAR/JC/kb



UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
WASHINGTON, D.C. 20545

May 23, 1975

JMC

Honorable James T. Lynn, Director
Office of Management and Budget

Dear Jim:

As agreed at our meeting of April 15, 1975, on the UEA proposal and alternative approaches to providing new enrichment capacity, I am supplying additional information in response to your specific questions and those of your staff.

We have continued to examine several aspects of this matter and have determined that the centrifuge approach to commercial enrichment is potentially more attractive than I had earlier believed.

- . in the past several weeks, ERDA staff met with eight organizations interested in private centrifuge enriching and/or manufacturing. The consensus is that the present Government centrifuge program (DCEF) is overly modest and that pilot plants -- expandable to large-scale modules -- are necessary for successful commercialization;
- . several asserted that centrifuge technology is at a stage worthy of capital investment and equity risk;
- . the Centar and EXXON centrifuge enriching proposals, which I have reviewed personally, are more attractive in many ways than UEA's diffusion proposal.

After further consideration, I have concluded that it is unlikely that the Government will need to build the first large centrifuge plant, or even pay for it; that at least three centrifuge proposers offer real competition to the UEA proposal; and that it is conceivable that 9 million SWUs centrifuge capacity can be on line in the 1984-86 time frame, provided chiefly by three competitive private enrichers.



At the same time, I conclude that the Government must commit to building an "add-on" plant.

- . re-opens the "order book" sooner and thus clears up domestic uncertainty over future capacity while moving to retain our share of the expanding foreign market;
- . affords flexibility in gauging the size and timing of the centrifuge plants; an increasingly valuable asset given the uncertain demand picture;
- . maximizes the opportunity for hand-off of Government contracts to centrifuge enrichers; this is not possible under the UEA proposal alone;
- . offers a good hedge against the uncertainties in feed availability and plutonium recycle which could increase needed SW capacity by several million units.

It has also become more apparent that the size needed for the proposed Government "add-on" diffusion plant, if any is built, is less certain now than earlier.

- . the growing evidence of centrifuge commercialization potential, alluded to above, will affect the size and timing of any diffusion plant;
- . the demand picture in general is changing substantially and we are proposing an open season to reassess the demand situation for the 1980's.
- . Government stockpile buildup and uncertainties of the War Reserve will also affect the rate of growth of needed capacity.
- . Uncertainties surrounding plutonium recycle have cast doubt on ERDA's ability to meet commitments of contracts contingent on recycling;



In light of these considerations, I now believe that ERDA's alternative plan should be accelerated by dropping the previously proposed Government demonstration centrifuge plant and moving instead directly into assistance for establishment of a competitive centrifuge industry.

In summary form, therefore, ERDA's recommendation is:

- Rejection of the UEA plan;
- Initiation of private enriching capacity on a competitive basis using centrifuge rather than gaseous diffusion separation methods. This advanced technology has much greater energy efficiency; and is more flexible in terms of meeting shifting demand.
- Commitment to take orders, both foreign and domestic, as soon as Congress permits; commitment to construct and operate a government add-on facility to serve such orders while the centrifuge industry gets underway; adjust the size of the add-on plant to the minimum needed to give private industry time to get established.

I believe that this approach constitutes better policy and is a more defensible proposal particularly because it applies government guarantees more appropriately in support of the establishment of a competitive enrichment industry rather than a single, sole-source supplier, such as UEA, and thus buys a better result.

On the basis of current estimates, our proposed add-on plant is expected to have a net budget impact of not more than \$100 million total before the higher enrichment charges already planned will begin to off-set new plant costs in 1978 with breakeven occurring in 1980.

The UEA approach is not the best alternative available to the government.

- As it now stands, the UEA plan represents both a sole source procurement and such a high Federal liability and low private risk that it

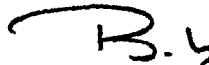
would set an undesirable precedent for future commercial ventures. For this reason, Congressional support will be most difficult to achieve and, even if such authorization is achieved, 9-12 months will have passed without an assured program for meeting demand for enriched uranium.

-- Negotiations with UEA would require a number of months and -- even if their position proved more acceptable -- would still not of itself speed the re-opening of the "order book" nor establish enrichment on a competitive basis.

Altogether I believe these measures will provide additional capacity when needed in the 1980's, and do so by a judicious and politically salable mixture of Government and private programs, retain a large share of the expanding foreign market, and give birth to a private centrifuge industry -- all with acceptable risk to the Government, reasonable implications for Federal outlays, and a good precedent for future commercialization ventures of this type.

The answers to your specific questions are contained in the enclosure. My staff and I would be glad to discuss these responses in more detail.

Sincerely,



Robert C. Seamans, Jr.
Administrator

Enclosure:
As stated

Additional Uranium Enrichment Capacity

Note: The following information is provided in response to specific questions from OMB. Occasional redundancy is necessary for completeness in responding to each question. Also, for the sake of clarity, question No. 3 has been addressed prior to question No. 2.

QUESTION NO. 1

How much time is needed for, and available for, the following:

- a. negotiation of ERDA contract with UEA?
- b. drafting of enabling legislation?
- c. UEA negotiations with other potential equity partners?
- d. UEA negotiations with foreign and domestic customers for 75% of plant capacity?

To what extent could these actions be accomplished concurrently? Please provide a graphic display -- critical path analysis.

A graphic display and accompanying information is attached in Tab A. Briefly, however,

- a. 2-3 months are needed to agree on the features of the UEA - ERDA contract and an additional 2-3 months to agree on the detailed terms;
- b. 2-3 months are required for drafting the legislation;
- c. 2-3 months are necessary to locate UEA's foreign equity partners; followed by 4-6 months of contract negotiations.
- d. 3-4 months needed for locating foreign and domestic customers, 6-12 more to complete negotiations and reach 75% commitment.

Enclosure

Altogether, 8-12 months would be required to complete the steps leading to the UEA project's startup. This time frame

- . assumes concurrent action on all key steps and necessarily runs the risk of serious delay if setbacks occur in one or more of the steps;
- . assumes that Congress approves whatever is negotiated and does so "on time." Congressional action and timing may be problematical given the uncertainties of the UEA proposal and the emergence of the centrifuge alternatives, such as Centar, EXXON, Garrett et al that will also seek Congressional attention. It should be noted that Congressional action on LMFBR took 18 months -- a proposal that enjoyed the vigorous support of several key members of the JCAE. UEA's plan has thus far drawn fire from the Chairman of the House Appropriations Subcommittee on Public works (Evins) and the Chairman of the JCAE Subcommittee on Agreements for Cooperation (Montoya), among others;
- . assumes that negotiations with UEA go well and also that UEA will accept what Congress passes;
- . assumes no antitrust or regulatory problems including high foreign participation.

As to the time available for securing passage of the UEA proposal, the situation seems to be worsening. While the decision with respect to size and timing of new capacity can wait for several months, the decision with respect to the basic approach for providing new capacity must be made in a matter of weeks.

- . The absence of a credible decision is creating uncertainty among domestic utilities, thus casting doubt on the future of nuclear power expansion in this country;
- . Our large lead in centrifuge technology is diminishing due to our continuing indecision; the Germans and Japanese, particularly, are catching up;



- . The recent NRC decision on exporting procedures has complicated foreign access to U. S. nuclear materials; a credible source of capacity will encourage them to keep looking to the U.S. as a supplier and thus permit us to retain a healthy share of the expanding foreign market.
- . The UEA negotiation route is less credible now than a month ago because the NRC action on exports of nuclear materials will complicate UEA's bid for foreign customers; and because the very existence of several centrifuge proposals raise questions as to desirability of commercializing a diffusion plant.

QUESTION NO. 3

What are the pros and cons (or the risks and benefits) of going to Congress with an enabling legislative package for UEA versus enabling legislation for assistance programs for private entry in the future.

UEA Approach

A. Benefits from our standpoint of going to Congress with UEA include:

1. probability of being able to send legislative package to Congress faster than any approach except direct Government construction; and
2. Could be seen by Congress as less complex since only UEA is involved whereas the alternative approach is a mixed Government-private package with several corporate entities involved.

B. Risks from our standpoint include:

1. Loss of more time since the UEA proposal is fraught with uncertainties that will invite close Congressional scrutiny. Some members of Congress have already expressed hostility to the UEA plan (lack of sufficient UEA equity risk, lack of identity of equity partners, lack of firm contractual arrangements for domestic and foreign customers, etc.);

2. Loss of control over the nature of the legislation which, if a strong push cannot be mounted or maintained, could be completely rewritten into an undesirable but mandatory course of action, e.g., a semi-independent Government corporation for enrichment; and
3. Discouragement of future commercialization efforts if the first proposal fails for whatever reason. The first proposal, must be good enough to withstand strong Congressional cross-currents.

Alternative Approach

A. Benefits from standpoint of going to Congress with the Alternative Plan include:

1. Greater Congressional receptivity since the plan could be presented as "transitional" to commercial enrichment. It contains both a Government plant and several private pilot plants, as well as the other advantages. In short, more salable; and
2. Political base would be broader and more supportive since several corporations from several states would be involved (the President should capitalize on this before Congress does).

B. Risks include:

1. As with the UEA approach, possible outright rejection of the commercialization concept and rewriting of the bill in an undesirable manner; however, this is believed to be less risky than the UEA route since the Alternative Plan appears more defensible.
2. Present Congressional antipathy toward the big oil companies may have some negative effect on the centrifuge proposal inasmuch as EXXON and Atlantic-Richfield are involved.

QUESTION NO. 2

Comparison of advantages to the Government of going UEA vs. alternative route(s).

A brief comparative analysis follows based on certain key criteria such as relative cost, impact on eventual centrifuge commercialization, flexibility, etc. Tab B contains a summary comparison of the UEA Centar, EXXON and Garrett plans.

- A. Cost - UEA would avoid substantial Federal outlays -- assuming Government guarantees are not involved. Liabilities amount to as much as \$3.8 billion.
- ERDA's Alternative Plan means initial net outlays, however, our preliminary projections indicate that, with pricing changes in separative work now being recommended, net outlays can be held to less than \$100 million before total annual outlays can be offset by revenues beginning in 1978. Cumulative outlay breakeven would occur in 1980 followed by rapidly mounting net revenues thereafter. And, if the demonstration centrifuge is not Government-financed, the picture will be even brighter. This projection is based on the \$75-80 per SWU range and is calculated based on full costs to the Government. At \$75.21, maximum enrichment drain would be \$636 cumulative million in 1977, but most of that includes CIP/CUP; net new plant drawdown in 1978 is about \$85 million with breakeven in 1980.

B. Centrifuge Commercialization

- UEA route, if successful, could conceivably give some momentum to later centrifuge commercialization; but if the UEA concept were rejected, it almost certainly would discourage future commercialization ventures.
- UEA also offers greater assured capacity than do the centrifuge plants, but the relative inflexibility of GDP capacity is a drawback.
- The ERDA Alternative Plan offers the following advantages from the standpoint of centrifuge commercialization:
 1. less power to operate (about 1/10th of that needed for diffusion; or 300 MWe as opposed to 3,000 MWe);
 2. inherently greater "add-on" flexibility, a valuable factor given the current uncertainty of demand; UEA's total plant size must be committed early while the centrifuge process can be incrementally expanded as demand develops.
 3. with the add-on plant, less capital to construct (about \$1 billion less than a comparable 9 million SWU diffusion plant); eases drain on hard-pressed capitalization market;

4. less of an antitrust problem since several suppliers would be involved; and
5. establishes a whole competitive industry, including competitive procurement, using a new, more efficient technology, rather than simply a single additional supplier utilizing an aging technology that offers virtually no future economic or technological advantages.

C. Construction of an add-on gaseous diffusion plant

UEA agrees that a privately constructed and operated add-on plant is not a realistic option. ERDA's Government add-on plant:

- removes all doubt that additional capacity will be available in mid-1980's, thus encouraging continued expansion of nuclear light water reactor power plants;
- takes advantage of potential available power at Portsmouth;
- small enough to avoid large-scale Government outlays;
- believed to be more salable to the Congress than the UEA plan; and
- hedges the risk that centrifuge technology may possibly encounter some unforeseen engineering obstacle that would delay bringing capacity on line when needed.

D. Decisive Action

- UEA is less credible as a decisive action than ERDA's Alternative Plan which contains the add-on feature combined with a strong centrifuge commercialization push.

E. Flexibility

- UEA proposes a 9 million SWU plant the demand for which is less certain now than earlier.
- The Alternative Plan affords greater flexibility by providing some assured capacity via the add-on GDP leaving more time to adjust the size and scheduling of the private centrifuge to market conditions as they clarify.

F. Competition

- UEA is a sole source supplier and thus runs counter to Government interface policies with the private sector.
- The Alternative Plan provides healthy competition resulting in the establishment of an industry.

QUESTION NO. 4

What is specifically unacceptable about the UEA proposal? What kind of package could ERDA recommend?

Our recommendations are not predicated on specific problems with the UEA plan although they do constitute an important consideration. Rather, we are mainly concerned with the broader implications of going the UEA route -- namely the undesirable policy precedent that would be set by providing assistance on a sole source basis to establish a single supplier; the difficulty in defending such a proposal before the Congress in a timely manner; and, even if successful, the establishment of a single last-of-its-kind diffusion plant, rather than a competitive future-oriented centrifuge enrichment industry. Therefore, even if the UEA package could be made "acceptable," the desirability of proceeding the UEA route remains highly questionable.

With specific regard to the UEA plan, a basic weakness is its incompleteness as a proposal. Important gaps exist in such areas as specific equity partners, corporate base, and source of power for the GDP. It is difficult to comment on the acceptability of elements of a proposal that have been only vaguely developed or omitted altogether. Much of the UEA plan has emerged only after intensive probing on ERDA's part.

Another problem is that several features of the proposal are unconventional to say the least. For example, the lack of risk to UEA, the "hell or high water" provisions in UEA-customer contracts, and the open-ended cost overrun concept. Such features are controversial and difficult to judge with any assurance.

We also believe that as a matter of desirable and defensible policy, Government assistance for any commercialization venture should be commensurate with the amount of risk involved on the part of the private sector. Since diffusion technology is fully developed on commercial

scale, we therefore think that the amount of risk to UEA should be higher than the risk assumed by a prospective centrifuge plant operator. Of course, the degree of Government assistance for centrifuge will be honed by competition.

Taking the foregoing into account, we cannot say precisely what UEA plan would be "acceptable". But it would appear that adjustments to the existing UEA plan would have to be made in the following areas:

1. Require greater UEA equity (probably more than 25%).
2. Require greater UEA risk such as defaulting utilities.
3. Eliminate open-ended project cost overrun concept.
4. Assure strong U.S. participation in decision role if ERDA is to provide a performance guarantee.
5. Except for major licensing changes by NRC, UEA should be committed to completion of the facility.
6. Develop and enforce firm time schedule for UEA commitment/milestones.
7. Limit terms of Government obligation to purchase SWUs from UEA.

Also, in the area of UEA-customer contracts, we would like to see the removal of pricing concepts which may be discriminatory or inequitable (e.g., payment over contract period regardless of need; and "hell or high water" provisions).

As to what kind of package ERDA would recommend, the following summarizes our total proposed plan of action for development of additional enrichment capacity in the mid-1980's.

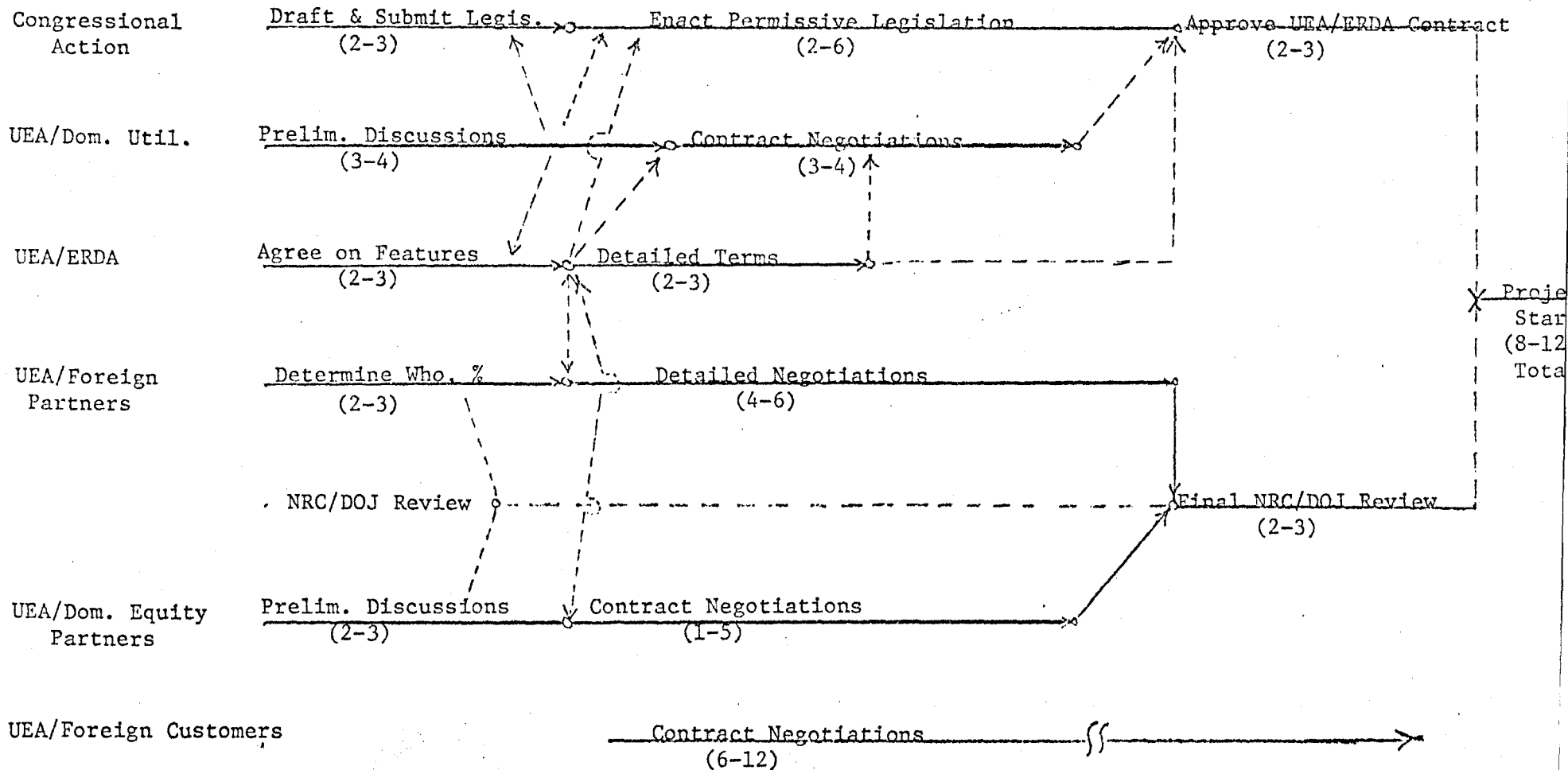
1. Draft and transmit legislation ASAP designed to authorize ERDA construction of a 4-5 million SWU gaseous diffusion add-on plant at Portsmouth; also seek authorization for entering into government-assistance contracts with 3-5 private corporations to construct and operate several 200-300 thousand SWU centrifuge pilot plants, expandable to 1-3 million SWUs by 1985; and concurrently issue Requests For Proposals on centrifuge enrichment.

2. Firm up estimates of demand for enriching services by announcing an open season for fixed commitment customers; and also open the "order book" for enrichment services from the new add-on diffusion plant as soon as permitted by Congress. Based on the firmed up estimates, decide within one year on the size and timing of the capacity to be met via add-on plant and the private centrifuge route. Assuming passage on the legislation in the meantime, complete arrangements and let contracts.
3. Place the Government's enriching operation on a paying basis to relieve pressure on the Federal budget. This would be done as follows:
 - a. Raise the price of SWUs closer to a commercial level based on Government costs, risks, and subsidies;
 - b. Attract foreign investment to the add-on diffusion plant as well as to the centrifuge plants; and
 - c. Organize ERDA's enrichment operation into a more self-contained, accountable unit. This could also help de-fuse interest in establishing a Government enrichment corporation.

FIGURE 1

UEA-RELATED ACTIVITIES THAT
MUST PRECEDE PROJECT START

(Estimated months in parenthesis)



Time Requirements for UEA - Related Negotiations

The generalized analysis shown in Figure 1 is an attempt to depict graphically the activities that must precede final UEA project authorization. The diagram does not purport to show a critical path analysis, per se, since it is essentially impossible to estimate the exact time required for complex, parallel, interrelated negotiations with any validity. It does describe, in broad terms, the features of UEA-other party negotiations, interrelations among them, and rough estimates of the time required to complete the various negotiations. Follow-on sections describe in somewhat more detail the type of activities to be conducted during each of the negotiations. A key point is that, in our view, the schedule represents the most optimistic that can reasonably be assumed. It further assumes that an Executive Branch negotiating position on several key issues has been established. These include:

- acceptability, in principle, or with limitations, of various aspects of Government assistance proposed by UEA, or acceptability of alternatives which may achieve the same result.
 - acceptability of UEA's proposed utility contract terms as they may influence Government support to the project.
 - character and degree of risk that should be assumed by equity.
- a. UEA-ERDA Contract - 4 to 6 months from Executive Branch decision to enter into negotiations

Negotiations must resolve these, among other, issues:

- Degree of ERDA involvement in details of design and construction in order to provide assurance of plant performance
- Nature and extent of government loan guarantees (contingent or otherwise)
 - method of providing
 - defining project cost limits
 - defining domestic share being guaranteed - depends on UEA success in attracting foreign participants

- Method of covering any overruns
 - degree, if any, of UEA domestic equity contribution
 - foreign participant's commitments to overruns - requires feed-back from those negotiations
 - necessity of provision, or determination of alternatives
- Determining mutually acceptable groundrules for "economic frustration" of project
 - degree, if any, of domestic equity protection
 - foreign participants acceptance
 - conditions for invoking - present concept too broad
- Establishing precise details of SW involved in stockpile access and load leveling
 - amounts, time
 - method of payment
- Conditions, if any under which ERDA would cover defaulting utility obligations
 - defining other actions UEA must take prior to ERDA coverage
 - limits to ERDA exposure
 - equity risk prior to ERDA coverage

It is estimated that this process would require 4-6 months, including:

- 2-3 months to reach agreement with UEA (including respective management approvals) on basic features of package, and crank in feed-back from UEA-utility negotiations (which will influence the degree of government (vs customer) risk
- 2-3 months to negotiate final detailed contract, including respective management approvals



The first part of this process (establishing basic features) could be shortened considerably if the Government were to simply agree to whatever features UEA felt it needed (e.g. no appreciable equity risk, overrun protection from outset, near-term market assurance by ERDA, defaulting customers). However, the time then required to get Congressional approval of such a contract, in light of concerns verbalized by Representatives Evins and McCormack and Senator Montoya^{1/} over such features of the UEA proposal, plus anticipated utility industry opposition, is very likely to be much longer than if the Government were to drive a harder bargain with UEA at the outset. Conclusion - time required from start of negotiation to final congressional action of package is likely to be about the same either way, however, simply accepting the UEA approach would introduce a higher risk of Congressional non-acceptance.

b. Congressional Action - 4-9 months

- Enabling Legislation

- Permissive legislation could be drafted, coordinated within the Executive Branch and submitted in 2-3 months
- Enactment of permissive legislation could require 2-6 months, depending on:
 - breadth and character of the legislative package, and direction UEA-ERDA negotiations are taking
 - utility lobbying efforts
 - degree to which Representatives Evins and McCormack's and Senator Montoya's publically stated concern is shared in Congress
 - structure of UEA participant organization as it unfolds

- Approval of final package would depend upon

- degree of UEA/Government risk-sharing
- DOJ and NRC views on domestic and foreign participation
- acceptability to utility customers

^{1/} Hearings before House Subcommittee on Public Works, April 18, 1975 and before the JCAE Subcommittee on Legislation, March 6, 1975 (Reiterated in letters from Evins to Seamans of March 20 and April 18, 1975).

c. UEA-Potential Equity Partners - 3-8 months

- Probably no substantive action until the UEA/ERDA negotiations have proceeded sufficiently to clearly scope the Government's role (and equity risk) in the project
- If UEA/ERDA contract minimizes domestic equity risk, likelihood of obtaining domestic partners on a timely basis increases
- If UEA/ERDA contract increases equity risk, it will be more difficult to obtain domestic partners on a timely basis
- Before potential domestic partners become fully committed (and start contributing moneys), acceptability by DOJ and regulatory considerations by NRC (including economic controls) will need resolution

Conclusion: If ERDA basically agrees to all UEA requests on UEA terms, domestic equity partners could be on board (assuming no DOJ problem) in 3-6 months. If ERDA negotiates for a package with more equity risk, etc., a longer time will be required to attract potential domestic partners and may possibly re-open or extend negotiations. In that case, negotiations would likely not be completed for at least 6-8 months.

d. UEA-Foreign Participants - 6-9 months

- Basic structure, contingent upon U.S. Congressional approval of foreign participation (countries and proposed % off take) should be known within 2-3 months after Executive Branch decision to enter into negotiations with UEA
- Detailed negotiations with each foreign participant by UEA will require
 - agreement to terms, including
 - nature of irrevocable letter of credit
 - methods of cash draw-down during construction
 - limitations of letter of credit
 - vehicle for open-ended commitment to cover pro-rata share of all cost overruns



- Obtaining target participation of 60% foreign capital
 - to the extent UEA fails to obtain the degree and kind of foreign participation anticipated, it will impact upon the degree of US Government exposure

These detailed international negotiations will inevitably take time, as they will involve several segments of foreign governments and, perhaps, foreign utilities, and will influence (and be influenced by) the UEA/ERDA negotiation. At least 4-6 months will be required after the basic structure of the foreign participation is known.

Conclusion: 6-8 months after UEA/ERDA negotiations begin.

e. UEA-Domestic Customers - 6-8 months

UEA presently has 5 letters of intent, subject to a satisfactory Government assistance package being adopted, and mutually acceptable UEA/customer contract terms and conditions being adopted. Utility negotiating positions will be strongly influenced by:

- Nature of Government Assistance
 - performance, loan guarantees, overrun protection
 - extent of UEA equity risk and any attendant incentives to reduce costs
 - conditions in UEA/ERDA contract that afford customer protection
 - degree of defaulting customer protection
 - reduction or elimination of likelihood the "Hell or High Water" provision would be required
- Government posture that UEA is "only game in town"
 - utilities likely to stall supply contract negotiations while trying to encourage Congressional opposition, hoping for a policy change. Utilities concerns motivated by proposed UEA contract provisions including:
 - cost flow-through with no incentive on UEA to reduce costs

- "Hell or High Water" provisions requiring customer to pay, even if UEA cannot deliver
- Uniform duration contract payment obligation in which customers must begin payments when plant becomes operational, even if utility deliveries do not begin for several years
- If this does not succeed(3-4 months), substantive negotiations will begin when terms of UEA/ERDA contract are known

UEA will need 15-20 domestic reactors under contract to reach the domestic share of 75% commitment. This will likely involve contracts with 10-15 domestic utilities, and would probably consume 3-4 more months, once utilities decide to negotiate in earnest, obtain management and probably state PSC approvals.

Conclusion: Total time 6-8 months

f. UEA-Foreign Customers - 6-12 months

Most foreign commitments will be made with the foreign participants. However, it is likely that some foreign utilities who are not involved in equity participation would seek contracts with UEA. Terms and conditions would probably be similar to that offered domestic customers. Negotiating these contracts should not be a pacing item, unless required for UEA to obtain 75% capacity commitment.

g. DOJ/NRC Acceptance - 8-12 months

After domestic and foreign participants are known (6-9 months) antitrust and regulatory reviews must be made. Even with expeditious handling, the reviews would take 2-3 months. It is expected that Congressional and DOJ/NRC views would be interchanged during the course of the review. The DOJ/NRC position would become an input to final congressional action on the UEA/ERDA contract.

While no two projects are the same, an indication of the time consumed in complex contract negotiations is evidenced by recent experience with the LMFBR Demonstration Program. Significant milestones associated with Government/industry contract negotiations/approvals were:

January 1972	AEC accepts CE/TVA proposal as basis for negotiation
August 1972	Memo of Understanding signed
September 1972	JCAE Hearings on Memo of Understanding
January 1973	Memo of Understanding Amended
July 1973	Principal Project Agreements (ERDA/PMC/TVA/CE, ERDA/BRC and PMC/BRC contracts) signed
November 1973	W-PMC contract signed
January 1974	E&R-PMC contract signed

In this case, two years time was consumed in finalizing contractual arrangements.

TAB B

COMPARISON OF POTENTIAL
ENRICHER'S GOVERNMENT ASSISTANCE CONCEPTS

Item	UEA	CENTAR	EXXON	GARRETT
Project Description	<ul style="list-style-type: none"> - 9 million SWU GDP by '83 - 60/40% foreign/domestic - 85/15% debt - equity - minimal equity risk 	<ul style="list-style-type: none"> - 270,000 SWU centrifuge plant by '81 expanding to 3 million SWU by '86 - \$25 million at full risk initially, assuming Gov't. support - 25% equity in expansion 	<ul style="list-style-type: none"> - Minimum 1 million SWU centrifuge plant, plus supporting machine mfg. capability - Amount of equity risk unknown (Gov't. control until project is commercially viable) 	<ul style="list-style-type: none"> - 300,000 SWU centrifuge plant by '81, expanding to 2.7 million SWU by late '84 - 90/10% debt/equity
Process Guarantees	<ul style="list-style-type: none"> - Warrantees on ERDA-supplied equipment - ERDA technical expertise - Design&construction overview - Extends 1 year beyond full power 	<ul style="list-style-type: none"> - guarantee technology and performance thereof for 9-10 years - supply or cause the supply of machine at reasonable cost 	<ul style="list-style-type: none"> - Gov't owned and controlled enrichment project until such time as project has proven its economic viability (defined at outset), when private operation takes out Gov't. interest with commercial financing of under-termined debt/equity structure. 	<ul style="list-style-type: none"> - process guarantee for several years - ERDA involvement kept as minimal as possible, consistent with degree of Gov't. support provided
Completion Guarantees	<ul style="list-style-type: none"> - contingent Gov't. loan guarantees if commercial debt becomes unavailable for domestic share - Gov't. funding of domestic share of overrun - Gov't. take over in event of "Economic Frustration" <ul style="list-style-type: none"> - "Fair Compensation" for equity 	<ul style="list-style-type: none"> - Gov't. loan guarantees for all debt through 3 years operation of expanded plant (~1989) - Guaranteed debt eventually rolled over by commercial debt secured by take-or-pay supply contracts - If project fails, Gov't. takes plant, equity forfeited 		<ul style="list-style-type: none"> - Gov't. loan guarantees for all debt through expansion phase until sufficient operating experience is obtained to satisfy commercial lenders
SW-Price Support		<ul style="list-style-type: none"> - Continues until differential with ERDA charge is eliminated - Loan of 1 to "several million" ERDA SW over first 5 years to reduce average sale price 	<ul style="list-style-type: none"> - Determined by amount Gov't. receives for its interest in plants at time of private takeover. 	<ul style="list-style-type: none"> - Continues through expansion phase until economies of scale reduce SW costs to acceptable level (probably ERDA charge)
Backup SW	<ul style="list-style-type: none"> - Lease-purchase arrangement for up to 11 million SW over 4-5 years 	<ul style="list-style-type: none"> - Loan of ERDA SWU (see above) resolves this problem 	<ul style="list-style-type: none"> - None after private operator assumes control - However not directly addressed 	<ul style="list-style-type: none"> - Purchase SW from ERDA as needed - Not yet quantified
ERDA SW Purchase, Assurance of Market	<ul style="list-style-type: none"> - Purchase up to 6 million over 5 years; termination of ERDA contracts 	<ul style="list-style-type: none"> - ERDA should provide inducement for voluntary termination of ERDA contracts <ul style="list-style-type: none"> - "Commercial Charge" 	<ul style="list-style-type: none"> - Gov't. contracts with utilities <ul style="list-style-type: none"> - To be fulfilled by plant output - Transferred to private operator when plants sold 	<ul style="list-style-type: none"> - Sell Excess SW to ERDA <ul style="list-style-type: none"> - Not yet quantified
Defaulting Utility Obligation	<ul style="list-style-type: none"> - Assume obligations of defaulting utility, up to 50% of domestic share 	<p style="text-align: center;">Not Addressed</p>	<p style="text-align: center;">Not Applicable</p>	<p style="text-align: center;">Not Addressed</p>

Centar, Exxon, and Garrett concepts of Government assisting are very vague and preliminary, compared to UEA. As they develop their concepts in more detail, it is likely that their concepts of such assistance will change.

Government assistance such as described herein might prove sufficient to cause Goodyear to propose an enrichment project.