15 1302302

November 20, 1967

Mr. R. M. Elliott, Vice President
Oil Research & Development Corporation
[illegible] 42nd Street
New York, New York 10017

Dear Mr. Elliott:

The Shale Oil Engineering Appraisal Team has examined 21 retorting proposals, listed in attached Table I, which were submitted by the parties' working representatives. In accordance with my letter of November 16, 1967, the proposals were divided into Group A and Group B as follows:

A. Those which are acceptable subject matter by virtue of prior TAC agreement as set forth in Robert W. Scheessler's letter of October 27, 1967, in Paragraphs 2 a, 2 b and 2 c.

B. Those which require unanimous agreement by the TAC prior to detailed study by the Engineering Appraisal Team.

We have found that 15 of these proposals are in Group A, which we are currently considering, and 6 are in Group B because they involve either fluid beds or solids-to-solids heat transfer. The six proposals in Group B are transmitted herewith for TAC approval. To assist the TAC consideration of the six proposals, you will also find attached a list of technical pros and cons for each of the six proposals.

The Engineering Appraisal Team recommends that the TAC give their approval for the team to consider all six of these proposals.

Very truly yours,

K. L. Berry

Chairman
Engineering Appraisal Team

KLB:njp
Attachments

cc: Mr. F. R. Conley
Mr. J. H. Smith
Mr. H. P. Dengler
Mr. W. O. Taff
Mr. J. L. Meisel
Mr. R. Mungen
Mr. R. T. Ellington
Mr. G. A. Blaine

11-30-67

ESSO PROPOSAL NO. 5
"HOT SHOT" RETORT

PROS:

1. Separation of combustion and retorting zones should allow high oil yields.
2. Use of the mullite shot should minimize the amount of fines circulating from the spent shale burner to the retorting vessel.
3. Kerogen residue is the source of the heat.
4. Solids-to-solids heat transfer in the retorting zone produces minimum gas handling requirement.
5. The process can operate with raw shale fines included in the feed.

CONS:

1. Poor heat integration because oil vapor and fines leave the process hot.
2. Very good stripping is required to prevent loss of oil due to adsorbing oil vapors on the spent shale.
3. Raw shale is crushed to minus 1/2 inch size.
4. There may not be enough heat from burning the coke residue.
5. There is potential loss of hydrocarbons in the raw shale pre-heater.
6. There is a potential loss of mullite shot due to attrition and carryover.

11-30-67

MOBIL PROPOSAL NO. 3
FINES RETORTING BY FLUID BED

This method has a low priority because it depends on successful development of the gas combustion process.

PROS:

1. Good operability is foreseen.

2. The process will utilize fines normally rejected by the gas combustion retort.

CONS:

1. Poor heat recovery.

2. Potential burning of oil and gas in the retort.

11-30-67

SINCLAIR PROPOSAL NO. 1
SHALE MILL

PROS:

1. The process will handle coarse shale feed.

2. Separate combustion and retorting zones allow high oil yield.

3. The solids-to-solids heat transfer in the retorting zone allows minimum gas handling.

CONS:

1. The coarse shale must be ground within the retort to less than 1/4 inch in size.

2. The residence time for the grinding and retorting action to occur is unknown.

3. There may not be enough coke residue to furnish heat required for the process.

4. The heat integration is poor since hot oil vapor and warm spent shale are discharged from the process.

5. There is a possible hydrocarbon loss in the operation of the raw shale pre-heater.

11-30-67

SINCLAIR PROPOSAL NO. 2
THERMAL EFFICIENT PROCESS

PROS:

1. The separate combustion and retorting zones should allow high oil yield.

2. The solids-to-solids heat transfer in retorting zone minimizes gas handling.

3. Process provides for maximum heat integration. The propane used for the heat recovery system lowers compression costs.

4. The process can handle relatively coarse shale.

5. There is no net hydrocarbon loss from the raw shale pre-heater.

CONS:

1. The retort and burner designs are conceptual - details have to be defined.

2. Good seals and stripping steam are needed to prevent excessive propane loss.

3. Continuous processing of a propane slip stream will be required to eliminate impurities.

11-30-67

SINCLAIR PROPOSAL NO. 3
FLUID BED RETORT

PROS:

1. The separate combustion and retorting zones should allow maximum oil yield.

2. The raw shale fines can be included in the feed.

CONS:

1. Complex hardware is required in retort to get good heat transfer.

2. A high amount of recycle gas is required.

3. Elaborate design is required for the raw shale pre-heater and the spent shale cooler in order to get efficient heat exchange.

4. A high grinding cost is foreseen for production of the minus 1/2 inch feed.

5. Very good stripping is required in order to prevent loss of oil vapor by adsorption on the spent shale.

11-30-67

SINCLAIR PROPOSAL NO. 4
LURGI - RUHRGAS

PROS:

1. The separate combustion and retorting zones should provide for maximum oil yield.

2. The solids-to-solids heat transfer in the retorting zone minimizes gas handling.

3. The process can operate with raw shale fines included in the feed.

CONS:

1. The spent shale cooling by water spray is not suitable for Western Colorado.

2. The lift-pipe burner for spent shale combustion is probably inadequate.

3. The lack of raw shale preheat increases hot solid circulation rate.

4. There is poor heat integration since hot oil vapor is removed in the process.

5. There may not be enough coke residue for fuel.

6. High grinding cost is foreseen in order to produce the less than 1/2 inch feed.

TABLE I

RETORTING PROPOSALS
SUBMITTED BY PARTICIPATING PARTIES

		GROUP
Pan American Proposal No. 1	- Gas Comb. Base Case	A
Pan American Proposal No. 2	- Modifications to GCR	A
Pan American Proposal No. 3	- Retort A indirect gas heated retort	A
Pan American Proposal No. 4	- Retort B indirect gas heated sectioned retort	A
Pan American Proposal No. 5	- PETROSIX retort	A
Esso Proposal No. 1	- Upflow Shale Retort	A
Esso Proposal No. 2	- GCR with soaking zone	A
Esso Proposal No. 3	- Retorting under pressure	A
Esso Proposal No. 4	- General Indirect	A
Esso Proposal No. 5	- "Hot Shot" Retort	B
Conoco Proposal No. 1	- Letter of May 19, 1967 - Modified GCR	A
Conoco Proposal No. 2	- Letter of August 7, 1967- Indirect sectioned retort	A
Mobil Proposal No. 1	- Fines removal - Modified of GCR	A
Mobil Proposal No. 2	- Isolated comb. zone - Modified of GCR	A
Mobil Proposal No. 3	- Fines retorting - Fluid Bed	B
Mobil Proposal No. 4	- Indirect method	A
Sinclair Proposal No. 1	- Shale Mill	B
Sinclair Proposal No. 2	- Thermal Efficient Process	B
Sinclair Proposal No. 3	- Fluid Bed	B
Sinclair Proposal No. 4	- Lurgi-Ruhrgas	B
Sinclair Proposal No. 5	- Numerous base case ideas	A