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*for a sustainable future*

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## Latin American Development Organization

1. Chemical Industry  
2. Chemical Products  
3. Chemical Process  
4. Chemical Equipment  
5. Chemical Materials  
6. Chemical Research  
7. Chemical Engineering  
8. Chemical Technology  
9. Chemical Products  
10. Chemical Process  
11. Chemical Equipment  
12. Chemical Materials  
13. Chemical Research  
14. Chemical Engineering  
15. Chemical Technology

## APPENDIX

### CHICAGO AREA

(See Map 1)  
Chemical Systems for Proprietary  
Chemical Process  
Map 1 Chicago Area

This project is designed to attempt to find ways to produce  
chemical fractions which are competitive with the fractions which  
they can be replaced by existing fractions.

In the first place, at the Battelle Seattle Research Inc., a  
polymerized alkyl chloroate has been successfully prepared and yielded in  
the following proportion: 40% KClO<sub>3</sub>, 30% oil, 20%  
hydrogenated alkyl and 10% ammonia.

The crude alkyl chloroate was obtained by petroleum techniques,  
a 50% yield of gaseous chlorine being attained.

The alkyl chloroate is O<sub>3</sub>H pre-converted by pulverized alkyl in  
four stages with progressively increasing temperature, denitrification,

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We regret that some of the pages in the microfilm copy of this report may not be up to the proper legibility standards, even though the best possible copy was made at preparing the master for the

200-100  
100-50  
50-25  
25-10  
10-5  
5-2  
2-1

The following is a list of the names of the men who were killed in the battle of the Alamo.



2. From the first instant onwards we observed no performance, no change, hyperactivity  
was not observed, no tremors or convulsions or anything.

The upper left coronary artery was exposed, the right coronary artery was exposed.  
The heart was normal in size, color, texture, no gross abnormalities, no pericardial fluid  
was present, the heart was normal.

The lungs were normal, no rales, no crackles, no wheezes, no evidence of pneumonia,  
no evidence of edema, no evidence of pleurisy, no evidence of any respiratory disease.

The liver was normal in size, color, texture, no evidence of hepatitis, no evidence of cirrhosis,  
no evidence of any liver disease, the spleen was normal in size, color, texture, no evidence of any splenic disease.

The kidneys were normal in size, color, texture, no evidence of any renal disease, no evidence of any urological disease.

The heart was normal in size, color, texture, no evidence of any cardiac disease, no evidence of any cardiovascular disease.

The heart was normal in size, color, texture, no evidence of any cardiac disease.

The heart was normal in size, color, texture, no evidence of any cardiac disease.

The heart was normal in size, color, texture, no evidence of any cardiac disease, no evidence of any cardiovascular disease.

The heart was normal in size, color, texture, no evidence of any cardiac disease, no evidence of any cardiovascular disease.

The heart was normal in size, color, texture, no evidence of any cardiac disease.

The heart was normal in size, color, texture, no evidence of any cardiac disease, no evidence of any cardiovascular disease.

The heart was normal in size, color, texture, no evidence of any cardiac disease, no evidence of any cardiovascular disease.

Rebel and the remaining part of the ~~Yankee~~ forces, were  
tracing their course to the Atlantic Ocean, and were  
now, as far as we could see, about 10 miles from our  
position.

At 11 AM the rebels were still in sight, and were moving  
east.

At 1 PM the rebels had moved out of sight, and were  
still a mile or two away from our position.

At 2 PM the rebels were still in sight, and were moving  
towards the Atlantic.

The rebels had moved out of sight at 3 PM, and were following  
the rebels.

At 4 PM the rebels had moved out of sight, and were following  
the rebels.

Amount	W. Cash	L. Cash	Total
W. Cash			\$ .00
Category			
Salaries			
Payroll	1120	1.25	\$ .40
Proportion	200	3.00	\$ .40
Interest	300	0.10	\$ .10
Debt to rebels	100	5.00	\$ .50
Total Salaries	200	5.40	\$ .40
Total Expenses	200	5.40	\$ .40

### W. Cash L. Cash Total

Amount	W. Cash	L. Cash	Total
Salaries	1500	1.10	\$ .30
Tuition	1000	1.00 + 1.00	\$ .20
Lyons	2000	2.00 + 1.00	\$ .20
Cigarettes	2000	1.00	\$ .20
Penalties	100	0.10	\$ .10
Durance	40	25.00	\$ .00
Expenses	500	3.00	\$ .30
Total Expenses	2000	3.60	\$ .30

10/20/1971, 10:00 AM, 1971

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### Perch

Perch	Wt. (g)	Mean (g)	Variance
Perch 1	0.6	1.00	1.6
Perch 2	1.0	1.20	16.0
Perch 3	1.0	1.00	16.0
Perch 4	1.0	1.00	16.0
Perch 5	1.0	1.00	16.0

### Shall

Shall	Wt. (g)	Mean (g)	Variance
Shall 1	1.0	1.00	16.0
Shall 2	1.0	1.00	16.0
Shall 3	1.0	1.00	16.0
Shall 4	1.0	1.00	16.0
Shall 5	1.0	1.00	16.0

Total weight of perch =

21.5

### Bluegill

10/20/1971, 10:00 AM, 1971  
The following are the results of the bluegill sampling. This is a small sample,  
but it is representative of the catch. The mean weight is 1.00 g. The variance  
is 16.0 g. The standard deviation is 4.0 g.

### Wt/g

Bluegill	0.00
Bluegill	0.70
Bluegill	0.80
Bluegill	1.00
Bluegill	1.60
Bluegill	2.470
Bluegill	2.670
Bluegill	2.80
Bluegill	4.00

Properties of the sample

1. Mean weight = 1.00 g
2. Total weight = 21.5 g
3. Variance = 16.0 g<sup>2</sup>

4. ~~1980~~ 1981 - 1982
  5. ~~1981~~ 1982 - 1983
  6. ~~1982~~ 1983 - 1984
  7. ~~1983~~ 1984 - 1985
  8. ~~1984~~ 1985 - 1986
  9. ~~1985~~ 1986 - 1987
  10. ~~1986~~ 1987 - 1988
  11. ~~1987~~ 1988 - 1989
  12. ~~1988~~ 1989 - 1990

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卷之三

11  
卷之三十一

9. 1. 1. 1. 1. 1.

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Present and Total	62.10
Estimated Total	12.40
Total	74.50
Grand Total	4.00

It would be worth the time to review the technology being developed in the U. S. for coal gasification.

The approach used is to start with the hydrocarbon by-product of pyrolyzing lignite and to add hydrogen to it to produce a gaseous mixture of hydrogen, methane, ethane, propane, and butane. The amount of hydrogen added is determined by the amount of hydrocarbons produced. This is done at rates up to 100 tons per hour. The hydrogen is obtained from propane which is cracked in two separate reactors. After separation, the propane is returned.

## Hydrogenation

This process starts by roasting of a pulverized coal-oil slurry (in which the oil is hydrocarbon, usually kerosene or diesel fuel) operation), about 0.015 cu. yds., 11,12 lbs. of  $C_2 + C_3$ , 1.5 cu. ft.  $C_4$ 's and 1.1 cu. ft.  $C_5$ 's, in a furnace with 100 lbs. of catalyst. In addition, the catalyst is treated with a small amount of water. The procedure includes heating the catalyst at 3.5 lb. each of, with a portion of dry coal present. The weight ratio of coal to oil varies around 100:10.

## Pyrolysis

Dried coal is then heated in a retort to pyrolyze in four stages, with progressively increasing temperature. The multistage increases cracking temperature from stage to stage, decreasing concentration. On hundred pounds of coal, the yield is 1.1 cu. yds., 20-30 lbs. cu. ft. to 10-12 lbs. cu. ft. The yield per ton of coal is about 1.1 cu. yds.  $C_2 + C_3 = 1.2$  cu. ft. between range from 6 to 9,000 tons per day, depending on the coal quality, according useful amounts of  $C_2$ ,  $C_3$  and  $C_4$  hydrocarbons. The propylene content of the pyrolysis gas from Illinois coal after treatment of 10,000 tons of coal per day would amount to about 150 million lbs. a year. The ethylene potential is about 200 million lbs. a year.

Complete material balance is as follows:

Category	Description	Quantity	Unit Price	Subtotal	Discount	Net Total	Commission	Total Commission	Final Total
Electronics	Laptops	5	\$1,200	\$6,000	\$300	\$5,700	\$285	\$1,455	\$5,245
Electronics	Smartphones	10	\$800	\$8,000	\$400	\$7,600	\$380	\$1,140	\$7,260
Electronics	Tablets	3	\$600	\$1,800	\$90	\$1,710	\$85.50	\$262.50	\$1,447.50
Electronics	Cameras	2	\$1,500	\$3,000	\$150	\$2,850	\$142.50	\$353.75	\$2,496.25
Electronics	Peripherals	8	\$200	\$1,600	\$80	\$1,520	\$76	\$1,176	\$1,403.20
Electronics	Software	5	\$400	\$2,000	\$100	\$1,900	\$95	\$475	\$1,425.00
Electronics	Accessories	12	\$100	\$1,200	\$60	\$1,140	\$57	\$684	\$1,071.20
Electronics	Peripherals	10	\$150	\$1,500	\$75	\$1,425	\$71.25	\$356.25	\$1,068.75
Electronics	Cameras	4	\$1,000	\$4,000	\$200	\$3,800	\$190	\$770	\$3,030.00
Electronics	Smartphones	15	\$700	\$10,500	\$525	\$10,000	\$500	\$2,500	\$7,500.00
Electronics	Tablets	7	\$500	\$3,500	\$175	\$3,325	\$166.25	\$1,000	\$2,325.00
Electronics	Peripherals	10	\$120	\$1,200	\$60	\$1,140	\$57	\$285	\$1,055.00
Electronics	Software	6	\$300	\$1,800	\$90	\$1,710	\$85.50	\$516.50	\$1,193.50
Electronics	Accessories	18	\$80	\$1,440	\$72	\$1,368	\$68.40	\$1,368.40	\$1,368.40
Electronics	Peripherals	12	\$180	\$2,160	\$108	\$2,052	\$102.60	\$1,026.00	\$949.40
Electronics	Cameras	3	\$900	\$2,700	\$135	\$2,565	\$128.25	\$384.75	\$2,180.25
Electronics	Smartphones	10	\$600	\$6,000	\$300	\$5,700	\$285	\$1,455	\$5,245.00
Electronics	Tablets	5	\$400	\$2,000	\$100	\$1,900	\$95	\$475	\$1,425.00
Electronics	Peripherals	8	\$150	\$1,200	\$60	\$1,140	\$57	\$285	\$1,055.00
Electronics	Software	4	\$200	\$800	\$40	\$760	\$38	\$152	\$708.00
Electronics	Accessories	10	\$100	\$1,000	\$50	\$950	\$47.50	\$475	\$902.50
Electronics	Peripherals	12	\$120	\$1,440	\$72	\$1,368	\$68.40	\$684	\$700.00
Electronics	Cameras	3	\$800	\$2,400	\$360	\$2,040	\$102	\$303	\$1,737.00
Electronics	Smartphones	10	\$500	\$5,000	\$250	\$4,750	\$237.50	\$593.75	\$4,156.25
Electronics	Tablets	5	\$300	\$1,500	\$150	\$1,350	\$67.50	\$337.50	\$1,012.50
Electronics	Peripherals	8	\$180	\$1,440	\$72	\$1,368	\$68.40	\$542.40	\$825.60
Electronics	Software	4	\$150	\$600	\$30	\$570	\$28.50	\$117	\$552.50
Electronics	Accessories	10	\$90	\$900	\$45	\$855	\$42.75	\$427.50	\$427.50
Electronics	Peripherals	12	\$140	\$1,680	\$84	\$1,606	\$80.30	\$803.00	\$803.00
Electronics	Cameras	3	\$700	\$2,100	\$105	\$1,995	\$99.75	\$299.75	\$1,700.25
Electronics	Smartphones	10	\$400	\$4,000	\$200	\$3,800	\$190	\$770	\$3,030.00
Electronics	Tablets	5	\$200	\$1,000	\$100	\$900	\$45	\$225	\$675.00
Electronics	Peripherals	8	\$160	\$1,280	\$64	\$1,216	\$60.80	\$608.00	\$608.00
Electronics	Software	4	\$120	\$480	\$24	\$456	\$22.80	\$85.60	\$470.40
Electronics	Accessories	10	\$85	\$850	\$42.5	\$807.50	\$40.375	\$403.75	\$403.75
Electronics	Peripherals	12	\$130	\$1,560	\$65	\$1,495	\$74.75	\$747.50	\$747.50
Electronics	Cameras	3	\$600	\$1,800	\$300	\$1,500	\$75	\$150	\$1,350.00
Electronics	Smartphones	10	\$300	\$3,000	\$150	\$2,850	\$142.50	\$285	\$2,565.00
Electronics	Tablets	5	\$180	\$900	\$90	\$810	\$40.50	\$202.50	\$607.50
Electronics	Peripherals	8	\$140	\$1,120	\$64	\$1,056	\$52.80	\$528.00	\$528.00
Electronics	Software	4	\$100	\$400	\$20	\$380	\$19	\$76	\$304.00
Electronics	Accessories	10	\$75	\$750	\$37.5	\$682.50	\$34.125	\$341.25	\$341.25
Electronics	Peripherals	12	\$120	\$1,440	\$60	\$1,380	\$69	\$345	\$1,035.00
Electronics	Cameras	3	\$500	\$1,500	\$750	\$750	\$375	\$375	\$375.00
Electronics	Smartphones	10	\$200	\$2,000	\$1000	\$1,000	\$500	\$500	\$500.00
Electronics	Tablets	5	\$150	\$750	\$750	\$750	\$375	\$375	\$375.00
Electronics	Peripherals	8	\$130	\$1,040	\$640	\$1,040	\$520	\$520	\$520.00
Electronics	Software	4	\$80	\$320	\$160	\$1,600	\$80	\$80	\$1,600.00
Electronics	Accessories	10	\$65	\$650	\$325	\$325	\$162.50	\$162.50	\$162.50
Electronics	Peripherals	12	\$110	\$1,320	\$660	\$1,320	\$660	\$660	\$660.00
Electronics	Cameras	3	\$400	\$1,200	\$600	\$1,200	\$600	\$600	\$600.00
Electronics	Smartphones	10	\$150	\$1,500	\$750	\$1,500	\$750	\$750	\$750.00
Electronics	Tablets	5	\$120	\$600	\$600	\$600	\$300	\$300	\$300.00
Electronics	Peripherals	8	\$100	\$800	\$400	\$800	\$400	\$400	\$400.00
Electronics	Software	4	\$60	\$240	\$120	\$240	\$120	\$120	\$120.00
Electronics	Accessories	10	\$55	\$550	\$275	\$550	\$275	\$275	\$275.00
Electronics	Peripherals	12	\$90	\$1,080	\$540	\$1,080	\$540	\$540	\$540.00
Electronics	Cameras	3	\$300	\$900	\$450	\$900	\$450	\$450	\$450.00
Electronics	Smartphones	10	\$100	\$1,000	\$500	\$1,000	\$500	\$500	\$500.00
Electronics	Tablets	5	\$80	\$400	\$400	\$400	\$200	\$200	\$200.00
Electronics	Peripherals	8	\$70	\$560	\$350	\$560	\$350	\$350	\$350.00
Electronics	Software	4	\$50	\$200	\$100	\$200	\$100	\$100	\$100.00
Electronics	Accessories	10	\$45	\$450	\$225	\$450	\$225	\$225	\$225.00
Electronics	Peripherals	12	\$65	\$780	\$430	\$780	\$430	\$430	\$430.00
Electronics	Cameras	3	\$200	\$600	\$300	\$600	\$300	\$300	\$300.00
Electronics	Smartphones	10	\$80	\$800	\$400	\$800	\$400	\$400	\$400.00
Electronics	Tablets	5	\$60	\$300	\$150	\$300	\$150	\$150	\$150.00
Electronics	Peripherals	8	\$50	\$400	\$250	\$400	\$250	\$250	\$250.00
Electronics	Software	4	\$30	\$120	\$60	\$120	\$60	\$60	\$60.00
Electronics	Accessories	10	\$25	\$250	\$125	\$250	\$125	\$125	\$125.00
Electronics	Peripherals	12	\$40	\$480	\$240	\$480	\$240	\$240	\$240.00
Electronics	Cameras	3	\$100	\$300	\$150	\$300	\$150	\$150	\$150.00
Electronics	Smartphones	10	\$50	\$500	\$250	\$500	\$250	\$250	\$250.00
Electronics	Tablets	5	\$40	\$200	\$100	\$200	\$100	\$100	\$100.00
Electronics	Peripherals	8	\$30	\$240	\$150	\$240	\$150	\$150	\$150.00
Electronics	Software	4	\$20	\$80	\$40	\$80	\$40	\$40	\$40.00
Electronics	Accessories	10	\$15	\$150	\$75	\$150	\$75	\$75	\$75.00
Electronics	Peripherals	12	\$30	\$360	\$180	\$360	\$180	\$180	\$180.00
Electronics	Cameras	3	\$50	\$150	\$75	\$150	\$75	\$75	\$75.00
Electronics	Smartphones	10	\$20	\$200	\$100	\$200	\$100	\$100	\$100.00
Electronics	Tablets	5	\$15	\$75	\$75	\$75	\$37.5	\$37.5	\$37.50
Electronics	Peripherals	8	\$10	\$80	\$50	\$80	\$50	\$50	\$50.00
Electronics	Software	4	\$5	\$20	\$10	\$20	\$10	\$10	\$10.00
Electronics	Accessories	10	\$3	\$30	\$15	\$30	\$15	\$15	\$15.00
Electronics	Peripherals	12	\$5	\$60	\$30	\$60	\$30	\$30	\$30.00
Electronics	Cameras	3	\$10	\$30	\$15	\$30	\$15	\$15	\$15.00
Electronics	Smartphones	10	\$5	\$50	\$25	\$50	\$25	\$25	\$25.00
Electronics	Tablets	5	\$3	\$15	\$7.5	\$15	\$7.5	\$7.5	\$7.50
Electronics	Peripherals	8	\$2	\$16	\$8	\$16	\$8	\$8	\$8.00
Electronics	Software	4	\$1	\$4	\$2	\$4	\$2	\$2	\$2.00
Electronics	Accessories	10	\$0.5	\$5	\$2.5	\$5	\$2.5	\$2.5	\$2.50
Electronics	Peripherals	12	\$0.5	\$6	\$3	\$6	\$3	\$3	\$3.00
Electronics	Cameras	3	\$1	\$3	\$1.5	\$3	\$1.5	\$1.5	\$1.50
Electronics	Smartphones	10	\$0.5	\$5	\$2.5	\$5	\$2.5	\$2.5	\$2.50
Electronics	Tablets	5	\$0.3	\$1.5	\$0.75	\$1.5	\$0.75	\$0.75	\$0.75
Electronics	Peripherals	8	\$0.2	\$2	\$1	\$2	\$1	\$1	\$1.00
Electronics	Software	4	\$0.1	\$1	\$0.5	\$1	\$0.5	\$0.5	\$0.50
Electronics	Accessories	10	\$0.05	\$0.5	\$0.25	\$0.5	\$0.25	\$0.25	\$0.25
Electronics	Peripherals	12	\$0.05	\$0.6	\$0.3	\$0.6	\$0.3	\$0.3	\$0.30
Electronics	Cameras	3	\$0.1	\$0.3	\$0.15	\$0.3	\$0.15	\$0.15	\$0.15
Electronics	Smartphones	10	\$0.05	\$0.5	\$0.25	\$0.5	\$0.25	\$0.25	\$0.25
Electronics	Tablets	5	\$0.03	\$0.15	\$0.075	\$0.15	\$0.075	\$0.075	\$0.075
Electronics	Peripherals	8	\$0.02	\$0.2	\$0.1	\$0.2	\$0.1	\$0.1	\$0.10
Electronics	Software	4	\$0.01	\$0.1	\$0.05	\$0.1	\$0.05	\$0.05	\$0.05
Electronics	Accessories	10	\$0.005	\$0.05	\$0.025	\$0.05	\$0.025	\$0.025	\$0.025
Electronics	Peripherals	12	\$0.005	\$0.06	\$0.03	\$0.06	\$0.03	\$0.03	\$0.03
Electronics	Cameras	3	\$0.01	\$0.03	\$0.015	\$0.03	\$0.015	\$0.015	\$0.015
Electronics	Smartphones	10	\$0.005	\$0.05	\$0.025	\$0.05	\$0.025	\$0.025	\$0.025
Electronics	Tablets	5	\$0.003	\$0.015	\$0.0075	\$0.015	\$0.0075	\$0.0075	\$0.0075
Electronics	Peripherals	8	\$0.002	\$0.02	\$0.01	\$0.02	\$0.01	\$0.01	\$0.01
Electronics	Software	4	\$0.001	\$0.01	\$0.005	\$0.01	\$0.005	\$0.005	\$0.005
Electronics	Accessories	10	\$0.0005	\$0.005	\$0.0025	\$0.005	\$0.0025	\$0.0025	\$0.0025
Electronics	Peripherals	12	\$0.0005	\$0.006	\$0.003	\$0.006	\$0.003	\$0.003	\$0.003
Electronics	Cameras	3	\$0.001	\$0.003	\$0.0015	\$0.003	\$0.0015	\$0.0015	\$0.0015
Electronics	Smartphones	10	\$0.0005	\$0.005	\$0.0025	\$0.005	\$0.0025	\$0.0025	\$0.0025
Electronics	Tablets	5	\$0.0003	\$0.0015	\$0.00075	\$0.0015	\$0.00075	\$0.00075	\$0.00075
Electronics	Peripherals	8	\$0.0002	\$0.002	\$0.001	\$0.002	\$0.001	\$0.001	\$0.001
Electronics	Software	4	\$0.0001	\$0.001	\$0.0005	\$0.001	\$0.0005	\$0.0005	\$0.0005
Electronics	Accessories	10	\$0.00005	\$0.0005	\$0.00025	\$0.0005	\$0.00025	\$0.00025	\$0.00025
Electronics	Peripherals	12	\$0.00005	\$0.0006	\$0.0003	\$0.0006	\$0.0003	\$0.0003	\$0.0003
Electronics	Cameras	3	\$0.0001	\$0.0003	\$0.00015	\$0.0003	\$0.00015	\$0.00015	\$0.00015
Electronics	Smartphones	10	\$0.00005	\$0.0005	\$0.00025	\$0.0005	\$0.00025	\$0.00025	\$0.00025
Electronics	Tablets	5	\$0.00003	\$0.00015	\$0.000075	\$0.00015	\$0.000075	\$0.000075	\$0.000075
Electronics	Peripherals	8	\$0.00002	\$0.0002	\$0.0001	\$0.0002	\$0.0001	\$0.0001	\$0.0001
Electronics	Software	4	\$0.00001	\$0.0001	\$0.00005	\$0.0001	\$0.00005	\$0.00005	\$0.00005
Electronics	Accessories	10	\$0.000005	\$0.00005	\$0.000025	\$0.00005	\$0.000025	\$0.000025	\$0.000025
Electronics	Peripherals	12	\$0.000005	\$0.00006	\$0.00003	\$0.00006	\$0.00003	\$0.00003	\$0.00003
Electronics	Cameras	3	\$0.00001	\$0.00003	\$0.000015	\$0.00003	\$0.000015	\$0.000015	\$0.000015
Electronics	Smartphones	10	\$0.000005	\$0.00005	\$0.000025	\$0.00005	\$0.000025	\$0.000025	\$0.000025
Electronics	Tablets	5	\$0.000003	\$0.000015	\$0.0000075	\$0.000015	\$0.0000075	\$0.0000075	\$0.0000075
Electronics	Peripherals	8	\$0.000002	\$0.00002	\$0.00001	\$0.00002	\$0.00001	\$0.00001	\$0.00001
Electronics	Software	4	\$0.000001	\$0.00001	\$0.000005	\$0.00001	\$0.000005	\$0.000005	\$0.000005
Electronics	Accessories	10	\$0.0000005	\$0.000005	\$0.0000025	\$0.000005	\$0.0000025	\$0.0000025	\$0.0000025
Electronics	Peripherals	12	\$0.0000005	\$0.000006	\$0.000003	\$0.000006	\$0.000003	\$0.000003	\$0.000003
Electronics	Cameras	3	\$0.000001	\$0.000003	\$0.0000015	\$0.000003	\$0.000		

(1) After Hydrocracking

The oil product is hydrogenated to produce a synthetic crude for use as a refinery feed.

The char is desulfurized using dolomite as an  $H_2S$  acceptor.  $H_2S$  is recoverable from the pyrolysis gaseous from the off-gas from the hydrogenation unit. It is recoverable from both these sources.

#### Atlantic Refining Company

The Atlantic Refining Company's research laboratories have studied the hydrogenation of the CCOB crude oil. They also have provided useful analytical data on the basic composition of the syncrude and fractions from distillation thereof. The results of this work are given in the FLC report per-534 and Appendix. One conclusion of the work was that the syncrude was worth \$2.00 - \$3.00 a barrel, about the same as petroleum crude.

#### Consolidated Coal Company

This procedure involves depolymerizing the coal by heating under pressure with a coal-derived solvent, filtering off undissolved coal and ash and distilling off the solvent. About 60% of the dry coal dissolves. The ash-free product is then hydrogenated. Hydrogenation via the Irinox process and by the use of a molten zinc chloride catalyst have both been studied. By-product sulfur, ammonia and tar acid recoveries are reported.

Analytical data on the naphtho obtained both by Irinox and zinc chloride catalysts have been provided. These form the bases for the yields of aromatics used in this study.

#### Pittsburgh-Carnegie Coal Mineral Company

This procedure is similar to the above but solvation and hydrogenation are accomplished simultaneously. Practically all the carbon values of the coal are converted to soluble material and gas. The gas liberated during the pressure release from the solvation process and solvent removal is rich in hydrogen and olefins. The volume recoverable and estimated costs are given in the hydrogen and ethylene-propylene chapters.

The objective of this project is production of ash-free, low sulfur coal for use as fuel. No liquid fuel production is contemplated at present,

although the coal extract would be just as useful for gasoline production as the Conocoction Coal extract.

Bituminous Coal Research Inc. and  
IGT Coal Gasification Project

Both the programs involve the conversion of coal to methane. No significant amount of hydrocarbon is obtained except for some light oil coming from the hydrocracker in the IGT process. This light oil represents about 1% of the weight of coal recovered or contains from 12 - 15% benzene or C<sub>6</sub>H<sub>6</sub>. C<sub>6</sub>H<sub>6</sub> can be sold, or about 35 to 54 tons a day, 20-55 million lire. A poor, no elaborate processing scheme for its recovery or purification has been utilized. In any case, the volume would hardly be large enough to significantly affect the gas cost.

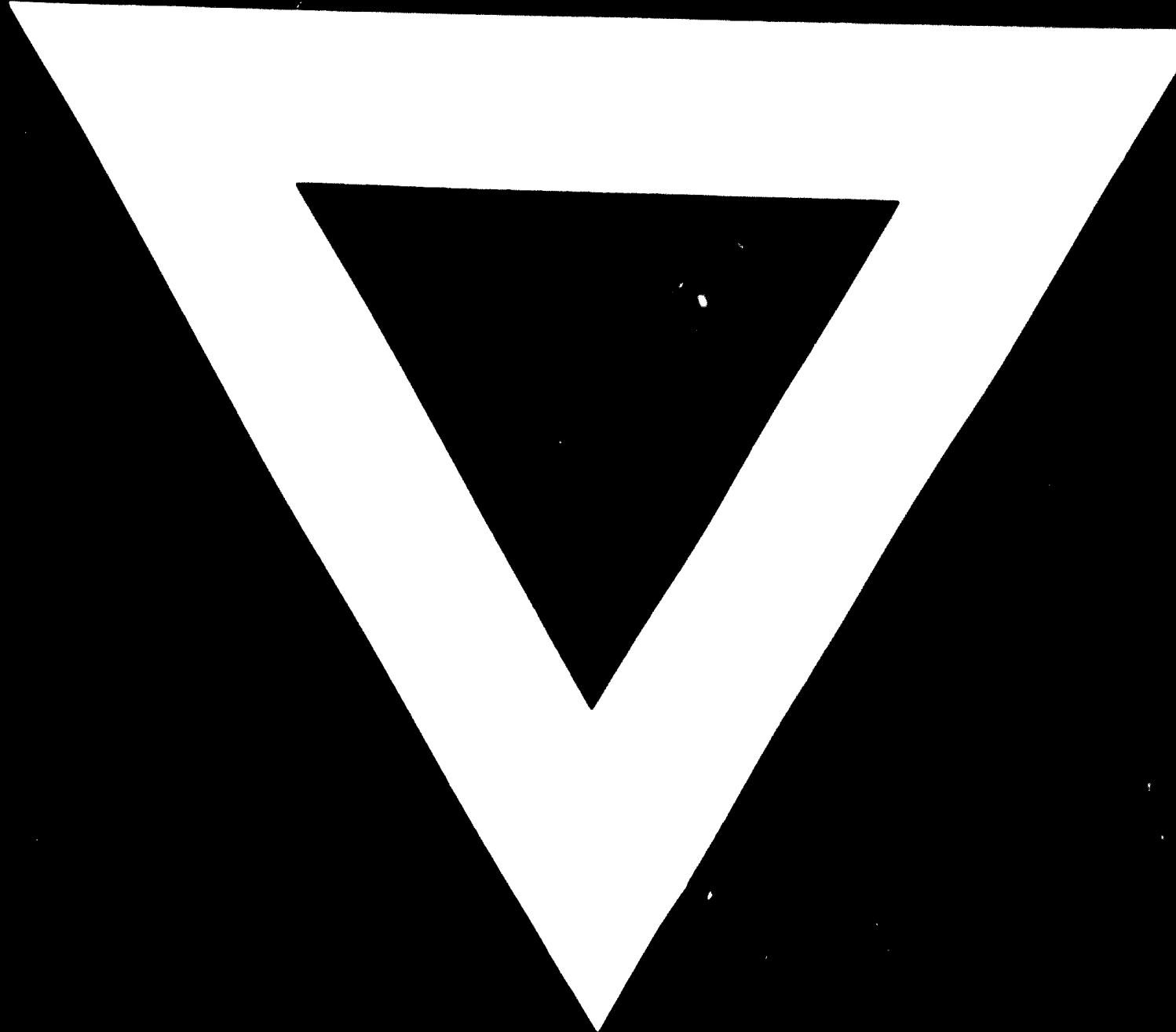
However, the potential volume of benzene from hydrogasification of lignite is considerably higher. The preliminary IGT work indicates the possibility of recovering about 50 million gallons of benzene a year from a 50,000 tons of coal/day operation. This is equivalent to about 1,500 benzene on the dry lignite produced.

The main by-products are sulfur and ammonia, recoverable in proportion to the S and N content of the coal. Ammonia appears as ammonium carbonate which readily reduces ammonia's heating. Sulfur production would be about 50,000 tons (1 cu.) a year. At .30,000/ton, this represents 2¢ per 1000 cu. ft. of gas.

Enormous volumes of CO<sub>2</sub> are produced, but the two contractors believe that its recovery for sale would not be advantageous.

Summary

Based on the heavy consumption of crude oil on a world-wide basis, coal will ultimately become a major source for fuels and particularly chemicals. The time may still be 15-20 years distance but continued advances in technology will make coal more and more attractive with advancing years.



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