



Hooker's Wilkenfeld (standing) discusses environmental research with operating personnel.

A day on the ecology front

In typical workday, a chemical company's pollution control expert gathers technical data that he relays to colleagues

What's a typical week in the field for a chemical company's director of environmental health? Take Hooker Chemical's Jerome Wilkenfeld, who flew into Buffalo, N.Y., to visit the company's Niagara Falls plant after conferring earlier in the week with Dow Chemical pollution control specialists in Midland, Mich., and advising on plant operations at Hooker's Detroit plant.

That's a thumbnail sketch of the kind of activities chemical companies' pollution control executives are involved in day to day (*CW*, June 29, '68, p. 48).

"My function," says Wilkenfeld, "is

to offer technical services in the pollution control field—such as legal, analytical and design information—to those with operating responsibility. To go further than that is a mistake. After all, the plant manager is already responsible for costs, safety and efficiency, and he should be accountable for pollution control also."

Wilkenfeld, to gain information he passes on to his colleagues, belongs to a multitude of government and industry organizations and reads voraciously on the subject of pollution. He is helping to develop a new computer program for

pollution control, spends a lot of time "bugging" plant managers and sometimes goes directly to Hooker's chairman of the board.

Round of Activities: On his latest trip to Niagara Falls (where the company has its largest plant complex), Wilkenfeld inspected two major pollution control projects, was briefed on pollution control research projects at the company's nearby Grand Island technical services center, and had a breakfast meeting with the manager of the Hooker plant at Taft, La., and the pollution control specialist from Hooker's plant at Columbia, Tenn.

The two big new pollution control projects at Niagara Falls: an \$800,000 diversion sewer (90% complete) that will extend 400 ft. out into the Niagara River, carrying some 20 million gal./day of cooling water that had gone to the city's overburdened waste-treatment plant; and a 3,200-ft.-deep dis-

With Bird, Wilkenfeld plans pollution control by computer.

Lead's loss could be coal's gain

Aromatics in syncrude from coal give it premium value

If the lead comes out of gasoline (*p. 13*), synthetic liquid fuels from coal—which are rich in naphthenic and aromatic hydrocarbons—may be in big demand as high-octane blending stocks. Conservative pricing would peg the value of such materials at \$4/bbl., but this is bound to rise with a shift in emphasis to unleaded gasolines.

Another important factor working in favor of coal: a projected paucity of new domestic natural gas supplies. Thus, producer gas (35-45% combustibles, consisting mostly of carbon monoxide, hydrogen and methane) could be generated from coal char to augment dwindling reserves of natural gas.

Commercial COED: Cheered by these two "plus" factors, R. Tracy Eddinger, director of FMC's Project COED (Char Oil Energy Development) at Princeton, N.J., updated the process economics of a commercial-scale COED plant at last month's Denver meeting of the American Institute of Mining and Metallurgical Engineers (*CW, Feb. 25, p. 20*).

Flowsheets have been developed for processing 3.5 million tons/year of Utah A-seam coal (10,600 tons/day, 330 operating days/year). Assumption: a portion of the COED product gas will be used for process heat.

Coal would be crushed and dried, then pyrolyzed in several stages. The product charge is sent to an electrical power plant. The raw oil and gases are separated. Next, the gases are reformed with steam to produce hydrogen, and a portion of the hydrogen is used to hydrotreat the oil. Liquid product is a synthetic crude oil suitable for conventional petroleum refining. Excess hydrogen can be sent to an ammonia plant or to an oil refinery.

Three Options: Eddinger offers three options in the economic analysis (*table*).

Economics of synthetic fuels from coal

Case	I	II	III
Product gas	Hydrogen	Fuel Gas	Hydrogen
Process fuel	Gas	Gas	Char
Investment (million \$)			
Fixed capital	36.17	32.70	44.65
Working capital, at 7%	2.53	2.29	3.13
Total	38.70	34.99	47.78
Manufacturing costs (million \$/year)			
Coal, @ \$3/ton	10.50	10.50	10.50
Oxygen, @ \$6/ton	1.73	1.73	1.73
Utilities	1.70	1.39	2.36
Taxes, insurance, depreciation, maintenance	4.34	3.93	5.36
Labor, supplies, overhead	1.20	1.20	1.44
Total	19.47	18.75	21.39
Product values and profits (million \$/year)			
Char, @ \$2.75/ton	4.78	4.78	3.33
Oil, @ \$4/bbl.	18.80	18.80	18.80
Hydrogen, @ 25¢/1,000 cu. ft.	3.90	—	11.70
Fuel gas, @ 11.8¢/million Btu.	—	0.87	—
Total	27.48	24.45	33.83
Advertising, sales, research expense	1.38	1.22	1.69
Net sales value	26.10	23.23	32.14
Gross profit	6.63	4.48	10.75
Net profit, at 50% tax rate	3.31	2.24	5.38
Return on investment (percent)			
Before taxes	17.1	12.8	22.5
Discounted-cash-flow method	13	10	16

Basis: Commercial plant processing 3.5 million tons/year of Utah A-seam coal, operating 330 days/year.
Source: Project COED, FMC Corp.

Case I assumes that the process gas is upgraded to hydrogen and that part of the process gas is used as process fuel. For Case II, only sufficient hydrogen is made to hydrotreat the oil. A portion of the process gas, as in Case I, is sold as a fuel gas at coal value. Eddinger sets this at 11.8¢/million Btu.

In the third case, all the process gas is upgraded to hydrogen. A portion of the product char is gasified to producer gas and used as process fuel.

Product Values: Product char is credited at 90% of coal cost, based on gross heating value (\$2.75/ton instead of \$3/ton).

Hydrotreating studies have been carried out on COED oil by ARCO Chemical Co. as part of its Project Seacoke. On the basis of this work, and considering the unique character of the oil as far as aromatic content is concerned, Eddinger estimates that it has a value of

at least \$4/bbl. The syncrude oil has no sulfur in it and lacks a residuum fraction.

Therefore, Eddinger reasons, as lead is phased out of gasoline, syncrude values could rise from \$4/bbl. to perhaps almost \$5/bbl. Endorsements of this optimism are hard to come by. Rex Ellington of Atlantic Richfield's fuel laboratories in Dallas, Tex., sees the octane content of syncrude oil as a potentially important property.

For the record, Atlantic Richfield's position is that while the company is continuing its research in this area, liquid fuels from coal are not looked upon as a near-term answer to the octane question.

Industry observers suggest that any other comment from oil companies at this time might prejudice the posture they've taken in Washington on the subject of unleaded gasoline. **END**



Research Director Merrifield (center), chemist Lee tell of promising new treatment process.



Works Manager Hinckley shows core sample from site of disposal well, 3,200 ft. deep.

March 11, 1970 CHEMICAL WEEK 41

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ENVIRONMENT

posal well, for certain type acid wastes.

With Nickerson Hincley, works manager, and Fred Olotka, technical supervisor for the environmental programs for Hooker's industrial chemicals division, Wilkenfeld examined core samples that have been taken on the well site. But now it appears some of that acid waste stream might be salable.

Ernest Gedeon, assistant commissioner of environmental health for the Niagara County health department, joined Wilkenfeld and Olotka on an inspection of the two pumping stations and control apparatus for the company diversion project.

When the state power authority diverted the river's flow to build an intake, three local industries, including Hooker, installed effluent outfalls into the river. The idea was that the city would upgrade its waste-treatment plant, and the plant's cooling waters (which don't have to be treated) could be diverted directly into the river.

Research Round: At the company's technical services center, Wilkenfeld was briefed on developments in effluent control research by D. Bruce Merrifield, Hooker's director of research.

Together they viewed the work being supervised by chemist Sung Ki Lee. Wilkenfeld describes the project as "very promising," involving "a method of oxidizing materials in solution."

With M.O. Bird, manager of technical information systems, Wilkenfeld talked of his project for computerizing the quantities of information needed for efficient management of the company's pollution control efforts.

Back Home: On the wall of his New York office is a picture of Wilkenfeld shaking hands with former President Johnson. The occasion: signing of the '67 Clean Air Act. Wilkenfeld—as chairman of the Air Quality Committee of the Manufacturing Chemists' Assn.—had testified three times at hearings. Wilkenfeld has also been chairman of MCA's Water Resources Committee, member of the New York State Air Pollution Control Board, and a member of the advisory committee of the Conservation Foundation.

For Jerome Wilkenfeld each day is different. But like all chemical industry pollution control specialists, every day is aimed at the same goal: understanding among industry, government and the public, and achievements to meet a real need.

END