

OUTLOOK DETAILED FOR PETROCHEMICAL FEEDSTOCKS

"One favorable fallout from the energy crisis has been a better understanding by government officials and the general public of the importance of petrochemicals to the American economy." In this way Vincent L. Gregory, Jr., president of Rohm and Haas, last week led into some challenges facing technical people of the chemical industry, as he keynoted the 76th National Meeting of the American Institute of Chemical Engineers in Tulsa, Okla.

Most government officials were shaken by an Arthur D. Little, Inc., report showing that a 15% reduction in feedstocks to the petrochemical industry would result in the loss of more than 1.6 million jobs, Mr. Gregory notes. In addition, gross national product would decrease by \$65 billion to \$70 billion, according to the report.

But although the Federal Energy Office has given a high priority to petrochemicals, shortages persist because of feedstock and plant capacity limitations. Mr. Gregory estimates that the U.S. shortage of ethylene in 1974, for example, will be about 15% of present demand. About 5% will be due to lack of feedstock and 10% to shortage of hardware.

At the same time, a shift is on to heavy feedstocks for olefin plants. Much larger amounts of coproduct propylene will be made in these plants, leading to a surplus of propylene along with a tight supply of ethylene. And, Mr. Gregory says, if crude oil costs \$10 a barrel, ethylene may then cost 9 to 10 cents a pound and propylene 5 cents a pound. It's an interesting exercise, he told the engineers, to speculate on what will happen if propylene is freely available priced at 4 to 5 cents below ethylene.

The benzene shortfall in 1974 will be 5 to 10% of requirements, depending on when the Arab oil embargo is lifted, Mr. Gregory estimates. Currently, aromatic extraction units are running at capacity. And new capacity is two to three years away, if economic incentives exist to encourage investment in production units.

When price controls end, dramatic improvements in petrochemical output will result, according to the Rohm and Haas official. (He expects decontrol on the rest of controlled chemical products, such as benzene, in April.) At that time, demand may moderate because of escalating prices for ethylene, benzene, and their derivatives. Mr. Gregory foresees on balance economic incentives for technical developments that will lead to a higher growth curve for petrochemicals—with a much more reasonable supply-demand balance—than many experts now predict.

Synthesis gas made from coal seems to intrigue Mr. Gregory. He notes the possibility in the 1980's of synthesis gas at less than 2 cents a pound manufactured from coal costing \$10 per ton at the mine. Some evidence exists, he adds, that ethylene might be made from this synthesis gas at 3 to 5 cents a pound, leading to a new ball game if petroleum prices stabilize at \$7.00 to \$10 a barrel. Research under way to develop "clean fuels" from coal also could lead to aromatics at potentially low cost.

In addition to technical challenges, Mr. Gregory is concerned with political challenges both within and without the U.S. One of these is the possible impact of chemicals made in plants located in countries with large oil and gas reserves. The large amounts of gas

Gregory: challenges for technology



now being flared in the Middle East could be used in chemical plants there at give-away prices of 20, 10, or even 0 cents per million B.t.u. The know-how of a two-tier price system for oil and gas is freely available from the U.S., where it has been used for years.

Some chemicals will come from the Middle East, Mr. Gregory says. But a major chemical industry there will be a long time developing because trained technical personnel and a sophisticated industrial infrastructure are lacking.

Decision nears on vinyl chloride rules

Look for a decision this week on precisely how worker exposures to vinyl chloride should be regulated so as to prevent future deaths from a very rare form of liver cancer. Occupational Safety and Health Administration chief John H. Stender has on his desk proposed rules that industry fears could slow down measurably—even shut down altogether—all U.S. polyvinyl chloride production.

Recommended by the Government's National Institute for Occupational Safety and Health, the rules ask that atmospheric levels of vinyl chloride, now labeled a "cancer-suspect agent," be kept below "detectable levels" unless workers wear full-face, air-supplied respirators. Use of impervious suits in some cases and engineering and process changes, thus far unspecified, are also urged. Currently, the federal ceiling on vinyl chloride exposure is 500 p.p.m. compared with a 50-p.p.m. level that many PVC makers claim they maintain as a company standard.

Seven U.S. PVC workers have died from the liver cancer—five at B. F. Goodrich's Louisville, Ky., plant, and single fatalities at the South Charlestown, W.Va., plant of Union Carbide and Niagara Falls, N.Y., plant of Goodyear Tire & Rubber.

After a prolonged and heated in-house scientific debate, NIOSH decided it could not set a "safe limit" for the chemical. "We rejected the concept of a threshold limit for vinyl chloride gas in the atmosphere," Dr. Marcus M. Key, NIOSH director, told Mr. Stender.

Dr. Key also is strongly urging

OSHA to speed up its rule making. OSHA could shorten the time to get a rule out to four months.

NIOSH has yet to specify analytical methods or define what "detectable" means. Research techniques can detect parts-per-billion levels of the gas. This level would force all PVC operations to shut down, Dr. Kenneth M. Johnson of the Manufacturing Chemists Association tells C&EN. Stressing that he is not a PVC industry spokesman, Dr. Johnson adds that an exposure limit of 20 to 30 p.p.m., measured by less elegant methods, would be "stringent, but attainable in most plants in a reasonable period of time." Specific limits, even if only temporary or involving a phased lowering of exposures over two years, would be acceptable. He also questions the need for, feasibility of, and legality of NIOSH's suggested controls on releases of vinyl chloride to the "external environment."

The NIOSH proposal is "devoid of any enforceability" in not requiring immediate engineering changes to get to zero worker exposure, says Andrea Hricko, occupational health specialist with the Ralph Nader-affiliated Health Research Group. Firms merely can supply workers with respirators and develop target dates for future engineering changes. Thus the proposal fails to recognize "the emergency nature of worker exposure to a carcinogen."

Capital spending heavy all year

The surge in the chemical industry's outlays for new plant and equipment is likely to be running strong right through the end of the year. The most recent Department of Commerce survey of capital expenditure plans (made in January and February) indicates chemical companies expect to be spending at a record annual rate of \$5.5 billion during the last half of 1974, up from \$5.1 billion in the second quarter, \$5.0 billion in the current quarter, and \$4.8 billion in 1973's last half. At year-end 1973, the industry had projects already under way that would cost it \$5 billion to complete.

A similar pattern of continued increases in capital spending this year shows up in most other segments of industry, suggesting that competition for engineering and construction manpower and for equipment will be even heavier than now later in the year. For all

Capital outlays will rise in chemical process industries

\$ Billions, seasonally adjusted annual rates	1973 Full year	1974	
		First half	Second half
Chemicals	\$4.46	\$5.08	\$5.52
Petroleum	5.45	6.77	7.49
Rubber	1.56	1.53	1.80
Paper	1.86	2.26	2.70
Food and beverages	3.11	3.38	3.77
Stone, clay, and glass	1.49	1.31	1.63
Nonferrous metals	1.67	2.03	2.21
Iron and steel	1.38	1.74	1.83
All manufacturing	38.01	43.60	46.87
All industries	99.74	108.57	116.43

Source: Department of Commerce

of 1974, chemical companies plan to spend \$5.3 billion, slightly more than they were planning late last year and up 19% from last year's \$4.5 billion. As much as half that increase, however, probably will be accounted for by higher costs.

Another indication from the Commerce survey of chemical executives' optimism shows up in their estimate that the industry's sales will rise 10.9% this year, compared with a gain of 16.7% last year and 9.8% in 1972.

Dow opts out of AEC weapons plant

After 23 years of operating the Atomic Energy Commission's supersecret Rocky Flats, Colo., nuclear weapons facility, Dow Chemical has told AEC that the company wants out—and will not submit a proposal for a contract to continue operating the facility.

Neither Dow nor AEC is elaborating on why Dow is opting out. Earle B. Barnes, president of Dow Chemical USA, said in a press statement only that "Dow is in agreement with AEC's position that the contract should be opened up for proposals from other companies." AEC has said nothing, officially.

However, the facility, located about 16 miles from downtown Denver, has had labor problems in recent years. It experienced a \$40 million fire in 1969. And on Feb. 13 of this year, AEC issued a press release stating that the agency "is soliciting expressions of interest" from firms interested in operating the facility beginning July 1, 1975. Dow was invited to submit a proposal, AEC said, but would get "no advantage" for having operated the plant. In the past the contract had been renewed with Dow—without competition—at three- to five-year

intervals. Further, Dow had operated the plant since its inception in 1951 when the company participated in the selection of the site and design of the facility.

Early this month, AEC held an unclassified briefing for firms interested in seeking the contract. Companies sending representatives to the briefing included Monsanto Research, Boeing, LTV Aerospace, Avco, Pan American World Airways, Eagle-Picher Industries, Bendix, Hercules, Rockwell International, and Exxon Nuclear.

AEC described Rocky Flats as a production facility in the AEC weapons complex, which works with plutonium, beryllium, and other materials. Production activities for nuclear weapons include component and hardware fabrication and assembly, process development, R&D, and various chemical recovery operations including recovery of scrap plutonium generated in the fabrication of nuclear weapons components.

AEC estimates that the annual cost of all plant activities required under the operating contract is about \$70 million. In fiscal 1974 the plant has a payroll of \$37.5 million with 1600 hourly and 1300 salaried employees. Average age of plant employees is 43 years, with 11 years' service. Dow's Barnes notes that most of the present 2900 employees are expected to remain at Rocky Flats.

Nobelist Sutherland dead

Dr. Earl W. Sutherland, Jr., who received the Nobel Prize for Physiology or Medicine in 1971 for his discovery of cyclic AMP and studies on the mechanisms of action of hormones, died



last week in Miami, Fla. Dr. Sutherland, 58, was professor of biochemistry at the University of Miami, and previously held positions at Washington University (St. Louis), Case Western Reserve University, and Vanderbilt University. He had been an American Chemical Society member since 1955.

Dr. Sutherland discovered cyclic AMP (3',5'-adenosine monophosphate) in 1957. Subsequently, he elucidated the nucleotide's fundamental role in mediating hormone action and regulating cell activities, and proposed a unifying concept for the molecular basis of hormone action—already verified for a number of hormones. The concept involves cyclic AMP as a "second messenger," with hormones as "first messengers."