

Carbide to try new cracking reactor

169th ACS NATIONAL MEETING

Within the next three years, Union Carbide will build a 25,000 ton-per-year ethylene production unit of a new design. Although the primary interest will be ethylene production, the flexibility of the new unit may be instrumental in resurrecting acetylene as a major component in petrochemistry. Key to the flexibility is a new cracking reactor design.

At a Division of Petroleum Chemistry symposium on new approaches to fuels and chemicals by pyrolysis, Carbide's H. G. Davis noted that Carbide and the rest of the industry have found that conventional tube cracking furnaces don't offer much hope of higher

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ethylene yields in the future. When compared with some of the cracking furnaces built in the 1940's, many of today's tubular furnaces have no greater efficiency. Davis says that conventional furnace development has been aimed at higher production and not necessarily at higher efficiency.

But, if conventional tubular furnaces are wanting in efficiency, there are more efficient designs available, and Carbide plans to employ one of them at South Charleston, W.Va. It has been recognized for some time that operating hydrocarbon crackers at high severity and low residence times provides significant advantages for producers of ethylene and other related petrochemicals. A number of companies, such as M. W. Kellogg Co., are testing several designs that employ very short residence times.

Carbide has entered into a cooperative arrangement with the Kureha and Chiyoda firms of Japan to begin design and construction of the advanced cracking reactors—the design that Carbide thinks is farthest along at present. The new reactors use steam as an inert cracking medium. As partial pressure in the reactors (the partial pressure of everything but the inert steam) increases, yields of acetylene, butadiene, and hydrogen increase, while yields of methane, ethane, heavy liquids, and propylene fall. Similarly, decreasing the residence time at constant severity (essentially constant temperature) increases acetylene and hydrogen production.

In the process employing the new reactors, preheated hydrocarbon feedstock is injected as fine liquid droplets into a turbulent stream of superheated steam. Vaporization is almost instantaneous and mixing is extremely rapid. After a short residence time for pyrolysis to occur, product gases are quenched. The actual residence times range from a few milliseconds in the high-acetylene regime to as many as 50 milliseconds for products of more general utility.

With the advanced cracking reactors, acetylene becomes a much more important product than it is in conventional cracking chemistry. It is important enough to justify the revival of acetylene-based processes, says Davis, and he believes that a reversal of the present trend of declining interest in acetylene may be at hand. In any case, at Carbide, the designers now tend to think in terms of ethylene plus acetylene yields.

The reactors being designed for Carbide have several attractions. They include flexibility in the choice of feedstock, improved efficiency, greater and controlled acetylene production, and extremely short residence times. The great savings in raw materials and the ability to optimize over a wide range of product mixes more than counterbalance the increased investment and operating costs, Davis points out. □

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Tenneco starts up big PVC plant in Texas

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TENNECO Chemicals has brought its 250-million-lb/year polyvinyl chloride resin plant on stream at Pasadena, Tex.

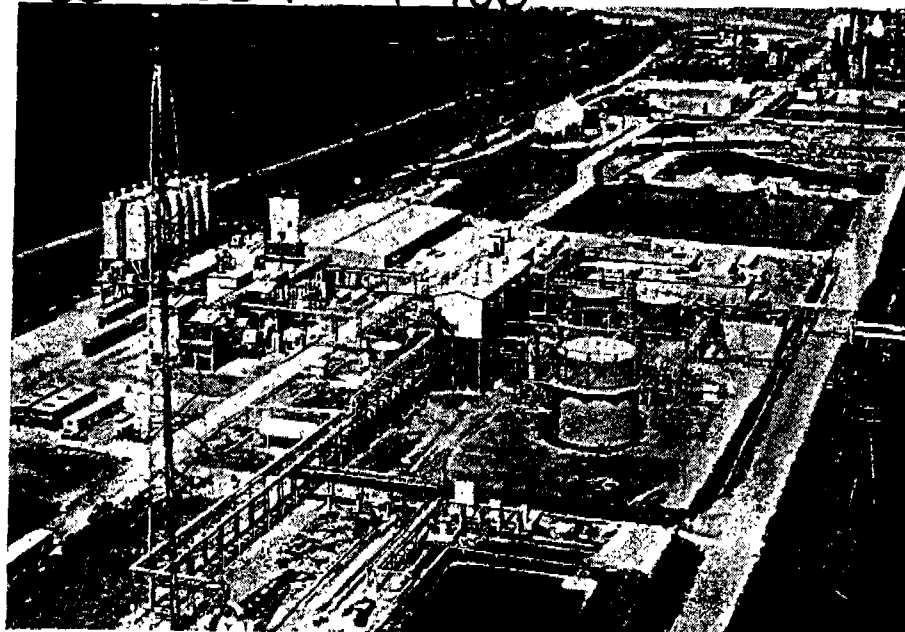
Special processing at the new plant, and changes made in the company's plants at Flemington and Burlington, N.J., permit Tenneco to provide 12 PVC grades with a maximum monomer content of 10 ppm. This is a 98% reduction.

"These resins will make it easier for fabricators to operate safely below the OSHA action level of 0.5 ppm or less vinyl chloride in work areas," Raymond H. Marks, Tenneco Chemical's president, said.

Tenneco's ultimate goal is commercial production of PVC resins with no detectable amounts of monomer.

A company spokesman estimated that \$7-10 million was spent to bring the New Jersey plants up to the new standard.

An estimated \$3 million was added to the total cost of the Pasadena plant by the design changes required



TENNECO Chemicals' new Pasadena, Tex., plant is the largest single-commodity, general-purpose PVC resin plant in the U.S. It doubles the company's output.

The OSHA regulation fixing a 1 ppm time-weighted average is presenting a more difficult goal. There is no way

level by the April 1977 deadline, and respiratory protection will be necessary at least part of the time. Marks

C.E.
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Recent cancer deaths of three employees who worked in a polyvinyl chloride unit of B. F. Goodrich Co. at Louisville, Ky., are being investigated by the company, to learn if they were related to occupational causes. The three deaths, in September 1971 and March and December 1973, were due to cancer of the liver. Goodrich points out that the prevailing exposure levels to vinyl chloride and other hydrocarbons at its Louisville facility and other plants are already well below today's federal OSHA limits.

Chemists Group Halts Vinyl Chloride Safety Report as Doubts Arise

By a WALL STREET JOURNAL Staff Reporter

WASHINGTON—The Manufacturing Chemists Association, or MCA, has stopped circulating a safety publication dealing with vinyl chloride following reports the chemical may possibly be associated with four fatal cases of a rare form of liver cancer among workers who handled the material.

The action by the industry trade group resulted from an announcement last month by B. F. Goodrich Co. that it was investigating the cancer deaths of three workers at its Louisville, Ky., polyvinyl-chloride plant. A spokesman said yesterday the company had confirmed a fourth worker at the plant had also died of the same form of liver cancer.

The association had revised its vinyl-chloride

safety publication in 1972 following reports by an Italian researcher that rats exposed to very large doses of vinyl-chloride vapors had developed malignant tumors of a kind that isn't found in man. At that time, the MCA report said that such an effect hadn't been observed in humans.

The association said it would issue a revised safety report on vinyl chloride after the question raised by the B. F. Goodrich finding is resolved.

Meanwhile, an MCA-sponsored task force on vinyl chloride, consisting of 19 companies that make the chemical, are continuing to study health records of vinyl-chloride workers through the industry. Animal studies are also being conducted. The task force began its work following the Italian report but has accelerated its study since Goodrich raised suspicions about the chemical, a spokesman for one of the companies said.

A Goodrich spokesman said the MCA task-force study on worker health records might be ready for presentation to the association "by the end of the month." The animal studies, he said, would take longer.

Almost all the vinyl chloride produced in the U.S. is used to make polyvinyl chloride, a plastic used in myriad products. Some five billion pounds of polyvinyl chloride, also known as

PVC, were produced last year. B. F. Goodrich is the largest maker, accounting for an estimated 18% of U.S. production.

The Labor Department will hold hearing beginning next Monday to examine the extent of worker exposure to vinyl chloride and to explore whether federal exposure standards should be tightened.

A spokesman for the MCA, whose 174 U.S. member companies account for 97% of vinyl-chloride production, said an attempt wouldn't be made to recall the vinyl-chloride safety publication but that medical representatives of all member companies and "various technical committees" have been alerted to the possible link between the chemical and human cancer.

FPC to Reconsider Southern Natural's Record Price for Gas

By a WALL STREET JOURNAL Staff Reporter

WASHINGTON — The Federal Power Commission will reconsider its Feb. 1 decision authorizing Southern Natural Gas Co. to purchase natural gas at a record price of 55 cents per thousand cubic feet.

The commission said it unanimously decided to hold hearings on the decision after being petitioned by the American Public Gas Association; Consumers Union of the U.S. Inc.; Sen. Hubert H. Humphrey (D., Minn.); Rep. Bill Gunter (D., Fla.), and the Attorney General of Florida.

3/8/74

Houston Oil & Minerals Reserves

HOUSTON — Houston Oil & Minerals Corp. said net reserves for 1973 were 15.5 million barrels of oil and condensate and 340 billion cubic feet of natural gas, as estimated by independent petroleum engineers. These net reserves compare with 8.6 million barrels of oil and condensate and 93 billion cubic feet of gas a year earlier.

VCM—a possible cancer risk?

THE plastics industry was rocked by the news last week that vinyl chloride monomer (VCM) has come under sudden scrutiny as a possible carcinogen.

ICI has stated that it is investigating the suspect death of one worker, although an extensive search of past employees' records has shown that no such risk has existed before. ICI employs around 400 people on VCM production, and a total of 1 200 involved in PVC manufacture.

The UK's Factory Inspectorate is to visit the UK companies involved in VCM and PVC manufacture in the next few days and discussions have already begun to decide what further action may be required to protect workers.

Columbia Gas System Hints Stock Offering

3/15

By a WALL STREET JOURNAL Staff Reporter

WILMINGTON, Del. — Columbia Gas System Inc. indicated plans to sell both new common and preferred stock to help finance additional gas supplies, for which it plans to spend about \$255 million this year.

The utility said it will ask stockholders at the April 18 annual meeting to increase authorized common to 50 million shares from 39.5 million and authorized preferred to 10 million shares from 500,000. Currently, it has 32.4 million common shares outstanding but hasn't yet issued any preferred.

Columbia Gas said it will require about \$175 million in new capital this year and, "at least for several years, the annual requirements will be of even greater magnitude." Last year it spent about \$175 million for new gas supplies, it added.

Combustion Engineering Unit Wins Japan Contract

3/15

STAMFORD, Conn. — Combustion Engineering Inc. said its C-E Lummus subsidiary was awarded a contract valued at several million dollars to design and engineer a chemical plant for Shin-Etsu Chemical Industry Co. of Japan.

Combustion said the plant's main product will be methyl chloride, used to make silicones. It will produce 30,000 tons of chemicals a year and will be completed in late 1975 at Naoetsu, Japan.

McMoRan Plans to Sell Interest in Properties To Dow Chemical Co.

4/15/74

By a WALL STREET JOURNAL Staff Reporter

DALLAS — McMoRan Exploration Co. said it concluded an agreement to sell a 20 interest in its domestic producing property to Dow Chemical Co. for \$5.8 million.

Most of the properties are on the Texas and Louisiana Gulf coasts.

McMoRan said the sale would enable to reduce its bank debt "substantially," a provide additional working capital through elimination of about \$50,000 a month in interest expense. The company added that the transaction would be accounted for reducing the oil and gas property account \$8.7 million from \$14.5 million, there would be a reduction of depreciation, depletion and amortization.

McMoRan also said the agreement provides it a continuing option for the next five years to repurchase up to 50% of the working interest to be acquired by Dow Chemical.

J. B. Rankin, president, said he anticipates that the sale would have "a significant positive effect" on the company's earnings for the fiscal year ending June 30.

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DRILLING-PRODUCTION

TWO producers have received a permit to sell gas from Offshore Louisiana for 35¢/Mcf, plus 3.5¢ more every 3 years under a 20-year contract.

The Federal Power Commission approved the sale by Pennzoil Producing Co. and Midwest Oil Corp. of 78 MMcfd to Sea Robin Pipeline from Block 225, Ship Shoal area. In clearing the sale at that price, FPC found no evidence of collusion in fixing the rate or that the parties engaged anticompetitive conduct which would taint the rate.

The FPC staff has asked for a ruling on whether the six working-interest owners in Block 225 had engaged in a common course of action or had hindered, lessened, or eliminated competition.

Natural gas companies are mounting a drive to end the 7.6¢/gal. duty on methanol used for fuel. In recent months, a number of ventures have been proposed for the construction of methanol plants in Saudi Arabia and Iran, with the product going to the U.S. for fuel uses. Methanol is considerably easier to ship and store than natural gas. Houston Natural Gas is studying such a project in Saudi Arabia. The Nixon Administration is backing legislation to end the duty.

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B.D. Goodrich Retiring As Chairman of Texas Eastern Transmission

By a WALL STREET JOURNAL Staff Reporter

HOUSTON—Texas Eastern Transmission Corp. said B. D. Goodrich will retire as chairman Friday, though he will remain a director. It said the chairmanship will be left vacant.

Mr Goodrich, 60 years old, joined the natural gas pipeline concern at its inception in 1947 as chief engineer. He was named president and chief executive in January 1965 and became chairman in 1971. Last March, he relinquished the duties of chief executive to George F. Kirby, president.

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Firestone Says Death Of Worker Seems Tied To Polyvinyl Chloride

By a WALL STREET JOURNAL Staff Reporter

AKRON, Ohio—Firestone Tire & Rubber Co. said the 1968 death of a worker at its Pottstown, Pa., plastics plant "appears to have been related to angiosarcoma," a form of liver cancer that is apparently associated with the use of vinyl chloride monomer in production of polyvinyl chloride.

Firestone said this is the first such death

reported among its employees.

In January, B. F. Goodrich Co. said the death of three workers at a plant in Louisville, Ky., from angiosarcoma of the liver may be related to polyvinyl-chloride operations. Union Carbide Corp. and Goodyear Tire & Rubber Co. later reported other liver-cancer deaths among their vinyl-chloride workers.

In March, the Labor Department's Occupational Safety and Health Administration issued an emergency temporary health standard, which sharply cut the allowable exposure to the industrial chemical. The measure took effect April 8.

Phillips Petroleum Buys Houston Natural Unit's Stake in Joint Venture

HOUSTON—HNG Petrochemicals Inc., a subsidiary of Houston Natural Gas Corp., said Phillips Petroleum Co. purchased its 50% interest in a natural gas processing and ethylene-manufacturing complex south of Houston. HNG and Phillips operated the complex as a joint venture.

The complex includes a natural-gas processing plant near Alvin, Texas, a liquid-products pipeline extending from Alvin to Phillips Sweeny refinery near Old Ocean, Texas, and ethylene-manufacturing facilities at the refinery. Terms of the sale weren't disclosed.

HNG said the Alvin processing plant will continue to process more than 500 million cubic feet of gas daily from the transmission facilities of Houston Pipe Line Co., another Houston Natural Gas subsidiary. It said Houston Pipe Line also will continue supplying the fuel gas to the complex under a renegotiated contract.

Separately, Robert R. Herring, Houston Natural Gas's president, told analysts here that the company expects to announce within 30 days plans to build an 18-inch coal-gas pipeline from the Colorado-Wyoming border to the Gulf Coast.

He said he hoped construction would start this fall and said he expects it will take about two years to build the pipeline.

W.R. Grace will market about 90% of the output of its new, 1,200-tons/day Trinidad ammonia plant in the U.S. Reasons: U.S. fertilizer markets are expected to remain strong; the Trinidad venture has favorable economics, based on 40-50¢/Mcf. gas with a moderate escalation clause over the 15-year life of the proposed contract; and tanker movement of ammonia to U.S. terminals is cheap. The plant, to be built in partnership with the Trinidad government, is expected to be completed by the end of '76, with capacity projected at 408,000 tons/year. It will be built by Fluor Corp. (Los Angeles). Grace says the cost, about \$55 million,

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Technology newsletter

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First application of Lummus Transcat technology will be for a 30,000-tons/year chloromethane plant for Shinetsu Chemical Industry Co. in Naoetsu, Japan. The process, in which ethane is a starting material, was codeveloped by Lummus and Armstrong Cork (CW Technology Newsletter, Mar. 3, '71). Transcat can be used to produce a variety of chlorinated materials, including vinyl chloride monomer. Another plus: the developers say there are no by-product or waste disposal problems for users of the process.

TEN 2614

Debating Health vs. Jobs

Plastics Industry Mobilizes to Thwart Tough Rules on Handling Vinyl Chloride

By WALTER MOSSBERG

Staff Reporter of THE WALL STREET JOURNAL

WASHINGTON — As the federal government moves closer to adopting stringent controls over handling of the ubiquitous industrial chemical vinyl chloride, manufacturers who use it are mobilizing to try to show that the controls would prove economically disastrous.

The rules would be utterly unworkable, the companies say, and industry would lose an essential manufacturing material. In consequence, they add, makers of plastic pipe, auto parts, phonograph records and many more products would be driven to the wall. And, they contend, thousands of jobs would vanish.

This gloomy picture is likely to dominate Labor Department hearings, beginning today, on planned standards for eliminating the exposure of plastics-industry workers to the chemical, which is suspected of causing cancer.

Exposure to vinyl chloride, a gas, has been linked by researchers to 19 cases of a rare liver cancer, angiosarcoma, among workers handling it in the U.S. and other countries; in 18 of these cases, death resulted. In addition, angiosarcoma has recently been blamed for the death of two employees in plants handling polyvinyl chloride, the powdered derivative of vinyl-chloride gas that is fabricated into a wide range of plastic products. (Two other deaths from angiosarcoma have been discovered among people living in the vicinity of plants using polyvinyl chloride.)

In April, the Labor Department's occupational safety and health administration imposed a temporary emergency standard limiting workers' exposure to vinyl-chloride gas to 50 parts per million in the air they breathe, a sharp reduction from the previous limit of 500 parts. Now, the agency is proposing—and witnesses at this week's hearings will debate—a standard cutting exposure permanently to "no detectable" level at all.

Although the plastics industry opposed the emergency ruling, its voice has so far been weaker than that of organized labor and various scientific groups, which back the tough rules.

Doom for the Industry?

At this week's hearings, however, the industry is expected to argue strongly that the "no-detectable" exposure plan would spell doom for the several dozen plants that make vinyl chloride gas or turn it into polyvinyl chloride powder or resin, and for most of the hundreds of plants that turn polyvinyl chloride into plastic products.

The standard would require that most operations in the production of vinyl chloride and polyvinyl chloride, which employs an estimated 6,500 workers, be conducted in closed-off, regulated areas where exposure can be controlled by ventilation devices or other methods. In addition, some operations of plants turning polyvinyl chloride into products, which are said to employ up to 700,000 workers, would be subjected to similar stringent engineering rules if those oper-

ations could cause the polyvinyl chloride powder or resin to release trapped quantities of raw vinyl chloride gas.

Last week the Society of the Plastics Industry, a trade group, asserted that sufficient technology doesn't exist to meet the proposed standard and warned that much of the vinyl and polyvinyl chloride industry might have to close if the standard goes into effect. The society predicted that 1.6 million jobs and "at least \$65 billion" in sales and production could be lost.

Ralph Harding Jr., president of the society, said that the proposed standard "is technologically infeasible to achieve, even with the highly sophisticated methods of in-plant control that have been developed by the industry over the years. If the proposed 'no-detectable-level' standard is adopted, the vinyl chloride and polyvinyl chloride resin producing industries will be forced to close down immediately."

The Labor and Health View

A number of labor-union and occupational-health experts are expected to dispute the society's claim at the hearings. They contend that it is possible to meet the standard without closing the industry.

But harsh predictions are contained in many of the more than 125 letters from plastics firms already on file with the Labor Department. The letters, representing the writers' formal "comments" on the planned rules, give an indication of the probable tone of this week's hearings. Although most letters concede that some controls are needed on vinyl chloride, most contend that the proposed measures would mean nothing less than the collapse of their industry.

Almost all the letters come from users of polyvinyl chloride, or PVC, and not companies directly handling vinyl chloride itself or those turning it into PVC. In most cases, they explain that their suppliers of PVC have told them the standards will make it impossible for them to continue producing the raw plastic. Urged to write to the government, the PVC users have done so, forecasting their financial ruin.

"Unless a reasonable approach is taken," wrote Frank Groeneveld Jr., president of a plastic-pipe-extruding firm in Florida, "it could mean the destruction of many small businesses such as ours where we have invested our life savings."

R. J. Clayton, chairman of Louver Drape Inc., a California maker of PVC window blinds and folding doors, wrote that "37 years ago, at the depth of the depression, I started a one-man business which has grown today where we do approximately \$7 million worth of business and employ over 250 people." If the new rules are imposed, he said, "we'd be back to a one-man business overnight."

One firm, Custom Trim Products Inc., which makes plastic trim for several big auto makers, warned that the new rules could cut off its supply of PVC resins, ending its production and causing it to risk lawsuits by Detroit for failure to fulfill supply contracts. The firm, an officer wrote, "would undoubtedly be forced into bankruptcy."

Hubbard Apiaries, a beekeeping company in Onsted, Mich., wrote to declare that it couldn't remain in business if PVC supplies were threatened because its honey is sold in PVC bottles and glass bottles are scarce as a result of a soda-ash shortage.

In fact, many of the letters contended that PVC is already in short supply, highly versatile and absolutely necessary for a variety of important uses.

Spokesmen for the record industry insisted that the plastic is vital to its opera-

tions. MCA Records Inc. contended that if the standards forced PVC production to end, "our industry would be forced out of business."

The National Association of Home Builders said the standards could drive the rising costs of housing even higher by forcing builders to abandon economical PVC housing components. It warned that such a development could mean "sorely needed housing would be beyond the reach of an increasingly large segment of the public."

Norton Co.'s plastics and synthetics division, which makes tubing for medical uses, warned that if the new rules curbed supplies of PVC, desperately needed equipment used in kidney dialysis and heart surgery might become unavailable. And Graniteville Co. of Graniteville, S.C., a maker of fire-retardant tents and tent material, called PVC "the most important component" in its products.

What's more, Arthur Culbertson, a Florida plastics executive, and Gerald Kessler, an officer of an Ohio plastics company, urged modification of the proposed standards on the grounds that they themselves had had long personal exposure to vinyl chloride without ill effects.

Most of the letter writers acknowledged the need to protect workers from the possibility of liver cancer. But they urged delay in imposing such harsh restrictions, both to give scientists time for further research and to allow the businesses to phase in the new controls.

But one writer took a decidedly less sympathetic view of the dangers of death from vinyl chloride. Jameson Crane, of Crane Plastics Inc., in Columbus, Ohio, wrote, "We continue to be impressed with the comparison of the number of deaths annually due to suicide prompted by loss of jobs, versus the 19 angiosarcoma deaths world-wide over 35 years of PVC production."

Chemalloy Gas Deliveries

TORONTO—Chemalloy Minerals Ltd. said it has been advised by the operator on an 11,000-acre Fort Worth Basin gas field in Texas in which Chemalloy has a 36% net interest that gas deliveries from 13 completed wells will begin by mid-July.

Chemalloy said its share of production revenue from the gas will exceed \$150,000 a month. Under 80% take or pay provisions of a previously reported contract with Coastal States Gas Corp.'s Lo-Vaca Gathering Co. unit, in force since May 27, the venture was credited with 250 million cubic feet of gas from eight completed wells in June. Currently, the basic price for the gas covered under the contract, which is reviewed annually, is 90 cents a thousand cubic feet, Chemalloy said.

In addition to the 13 completed wells, the operator of the acreage, Smedley Petroleum Resources Inc., Fort Worth, will be drilling an additional 45 well sites.

Chemalloy's net interest in the Texas field is 36% with Toronto-based Chesterville Mines Ltd., an affiliate, holding a 4% interest. Privately owned Smedley Petroleum Resources has a 40% interest, and the Texas land owner the remaining 20%.

Sun Oil Group Finds Gas in Two Wells Off Texas

TORONTO—Sun Oil Co. said a drilling group it heads discovered apparent commercial natural gas shows in two wells off the Texas coast.

Sun said the group is considering ordering a drill platform, "to develop the newly established reserves at the earliest possible date."

The wells are on the 2,904-acre Block A-369 in the High Island area about 150 miles off the coast of Galveston. The group acquired the block at the June 19, 1973, federal offshore lease sale. It also acquired an adjacent tract, Block A-369, at a federal lease sale last May 29.

Sun owns a 31.25% interest in the block and the wells. Other members of the group are: Anadarko Production Co., 10%; Eastern Exploration Co., which are 10% each of Panhandle Eastern Pipe Line and each of which has a 15% interest in Shamrock Corp.; 10% Lone Star Producing Co., a subsidiary of Lone Star Energy; 10% Ocean Drilling & Exploration; 10% Ocean Oil & Gas Co.; 10% Murphy Oil Corp.

The U.S. Supreme Court sent back for reconsideration a circuit court decision that prevented the Federal Power Commission from authorizing higher natural gas prices in the Texas Gulf Coast area.

Goodrich Unit Building Plant at Louisville Site For Polyvinyl Chloride

By a WALL STREET JOURNAL Staff Reporter

AKRON—B. F. Goodrich Chemical Co., a B.F. Goodrich Co. unit, said that it is building a new polyvinyl-chloride facility at its Louisville, Ky., chemical plant, but that the new plant won't meet proposed government vinyl chloride exposure level standards.

The company said that workers in the new plant, which will supplement an older facility, would be exposed to vinyl-chloride levels "lower than those currently existing in our five polyvinyl-chloride plants" but said that "the actual levels won't be known until the plant is in operation." The company said that the proposed Occupational Safety and Health Administration standard of "no detectable level" of vinyl chloride in work areas isn't "technically feasible."

Goodrich declined to state the cost or size of the facility. The Louisville plant was the site at which it was first discovered that there may be a connection between a certain type of cancer and vinyl chloride.

The company said that the plant was expected to begin production in mid-1975, and that work on the facility had already begun.

Goodrich said that any further cutbacks in exposure levels, arising from the company's research project on the problem, could take up to two years to implement, from the date of the development.

The statement came in testimony by a company official at hearings in Washington on the proposed government standard.

Floating chemical plants being built

Within the next 18 months or so, two unusual vessels will slip away from their moorings in western Europe and head for their destination half way around the world in Indonesia. Shortly after dropping anchor in the Strait of Makassar, separating the islands of Borneo and Celebes, chemical engineers expect to bring into operation the world's first floating chemical plants.

One of the ships will produce ammonia at a designed daily rate of 1500 metric tons. The other will be capable of making 1700 metric tons daily of urea (C&EN, April 1, page 13). Sharing the \$150 million contract are Brussels-based Coppée-Rust and IPI Constructors of Zug, Switzerland, which is responsible for overall management of the project.

The Indonesian state-owned oil company, Pertamina, will use gas associated with the offshore oil wells near

Texas Oil Buys Gas Field From Exxon for \$7 Million

DALLAS—Texas Oil & Gas Corp. said it purchased the Pickton natural gas field in Hopkins County, Texas, from Exxon USA for \$7 million. Exxon USA is the chief domestic unit of Exxon Corp.

Included in the acquisition are 16 producing gas wells, three producing oil wells, gathering lines and other related facilities and surface equipment.

Gas from the field currently is being sold to Lone Star Gas Co. under a contract that has seven years to run, Texas Oil & Gas said.

Halt of Allocations On Residual Fuel Is Proposed by FEA

By a WALL STREET JOURNAL Staff Reporter

WASHINGTON—Pursuing its plan to begin a phaseout of the petroleum-allocation program, the Federal Energy Administration proposed a 90-day suspension of the allocation rules covering residual fuel.

FEA Administrator John Sawhill also said that "deallocations" of other fuels, particularly aviation fuels and propane, will be proposed "as soon as practicable." However, the agency will move more slowly in relaxing regulations on the two most important petroleum products, gasoline and middle distillates such as home heating oil, and won't propose suspensions for them "until the latter part of the summer," Mr. Sawhill suggested.

About half the residual fuel used in this country is burned in the boilers of steam electric plants and most of the balance is used by industry, large apartment complexes and institutions. During the Arab embargo, demand for the heavy fuel exceeded supply by about 700,000 barrels a day, but currently "supply and demand have come into balance," the agency stated. The FEA projected adequate supplies of residual fuel "well into the fourth quarter."

The suspension of allocation regulations would take effect Aug. 1 and a public hearing on the proposal is scheduled July 22. Under federal fuel allocation law, the FEA also must submit such proposals to Congress before making suspensions final.

VCM scare keeps PVC tight supply

THE combined effects of the vinyl chloride monomer (VCM) cancer scare, Knapsack's recent plant explosion and what looks to be a lengthy strike at Norsk Hydro are keeping PVC in very tight supply in Europe, in contrast to easing markets for other major plastics. Throughout Europe, most VCM/PVC facilities are operating at levels reduced by around 6-10 per cent as producers seek to avoid a direct confrontation with unions and government bodies over the cancer issue. Older-generation plants are being kept under a particularly tight rein and in West Germany there is already speculation that some units may have to be prematurely closed when legislation on VCM levels in working atmospheres is announced.

The strike deadlock at Norsk Hydro has halted PVC production at the company's 60 000 ton/year Porsgrunn plant. Consumers in the UK, an established export market for the company's PVC, are already feeling the pinch.

The Norsk Hydro strike could be a long one; the margin between the pay claims of the 4 500 employees and Norsk Hydro's offer is believed to be large. The company will have to offer high wages rates to new labour to con-

struct its Rafnes petrochemicals complex and Mongstad refinery and existing company staff are determined not to be paid less than the newcomers.

In Spain, 70 per cent of the country's VCM capacity has been out of action for six weeks after a strike at the Martorell plant at Viniclor, owned by Solvay and Reposa. Lost production at the plant, which produced 120 000 ton of VCM last year, is so far equal to 12 per cent of expected 1974 production.

With more than 600 companies in Spain dependent on PVC supplies, the Spanish government is expected to announce suspension of PVC and VCM import duties soon.

But the biggest constraint on PVC production in coming months must inevitably be the effects of the cancer scare. The US debate on VCM levels in working atmospheres is being closely followed by European unions and the International Federation of Chemical and General Workers Unions (ICF) plans to call a world conference in Geneva later this year to study the issue.

Despite production problems, PVC growth rates in Europe have now slowed to around 3.4 per cent and supply could still balance demand later this year.

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Building safer PVC unit

B.F. Goodrich demonstrated last week that it apparently doesn't expect the Labor Dept's. Occupational Safety and Health Administration to promulgate its proposed "no detectable level" standard for worker exposure to vinyl chloride monomer (CW, June 26, p. 14).

While testifying at OSHA's VCM hearings in Washington last week, Goodrich Vice-President of Manufacturing John L. Nelson said the company has begun construction of a polyvinyl chloride plant in Louisville, Ky. The plant, to go into production in mid-1975, will significantly reduce VCM exposure, Nelson stated, but still will not be capable of reaching the proposed no-detectable-level standard (see also p. 30).

The new plant will incorporate Goodrich's latest PVC technology and will have several features that will result in a reduction in VCM exposure, according to Nelson.

Polymer reactors to be installed in the plant will be larger than those in the company's five other PVC installations. Goodrich contends that the larger reactors will have about 87% fewer VCM leak sources than those now in use. Other safety factors, according to Goodrich: greater use of computer controls and the fact that the plant will be an "outdoor" operation.

The Louisville plant will be located on the property where the company now operates a PVC plant, which was built in 1937, a Goodrich spokesman relates. He adds, however, that the new installation is meant to supplement, not replace, the old plant.

Knapsack VCM/PVC complex hit

A SEVERE explosion and fire hit Knapsack's West German VCM/PVC complex last Sunday afternoon, injuring three people.

The explosion occurred in the separation unit at the 150 000 ton/year ethylene dichloride (EDC) plant, causing damage estimated at well over DM1m.

A brief official communique from Knapsack, a Hoechst subsidiary, claims that the plant is expected to be back in operation within one month. But West German consumers are not so sure and are bracing themselves for severe market shortages, expecting PVC production to be badly affected.

7-12-74

Tougher Vinyl Chloride Rules Are Goal By Fall as Labor Agency Ends Hearings

By a WALL STREET JOURNAL Staff Reporter
WASHINGTON—Labor Department officials said they hope to issue new, tougher standards for handling vinyl chloride by Oct. 1 when the current temporary standard expires.

The department yesterday completed nine days of hearing on the proposed standard barring exposing workers to any "detectable" amount of the chemical. The hearings consisted mainly of plastics industry testimony asserting the proposed standard would be impossible to meet and would close down much of the industry.

But the hearings ended on a surprising note when an official of Merck & Co.'s Calgon Corp. described laboratory work showing that vinyl chloride gas can be totally removed from air by filtering it through activated carbon, which Calgon makes. It can later be recovered and reused.

However, other industry officials at the hearings insisted that the findings didn't

necessarily show how the technique could be used in an industrial plant, or how expensive it would be to install.

The Labor Department in April issued a temporary standard cutting vinyl chloride exposure to 50 parts per million in the air, responding to evidence that exposure can cause cancer.

Daniel P. Boyd, director of the Office of Standards Development for the department's Occupational Safety and Health Administration, said the evidence at the hearings indicates a standard of 25 parts per million can be met "across the industry." He said the actual standard would be "somewhere between zero and 25." A "no detectable" level would be about one part per million.

"There isn't any likelihood in my mind," he added, "that we're going to put the industry out of business."

Forty-four groups of witnesses from industry and labor appeared at the hearings.

Raytheon Unit Gets Order to Build Plant

By a WALL STREET JOURNAL Staff Reporter
LEXINGTON, Mass.—Raytheon Co. said its Badger Co. subsidiary received a multi-million dollar contract to build a Metaxylene plant for Amoco Chemicals Corp., a subsidiary of Standard Oil Co. (Indiana).

The plant, to be built in Texas City, Texas, is scheduled for completion in 1976 and will produce more than 100 million pounds of the chemical yearly. Metaxylene is used to produce an acid used in making resins that hold glass fiber together, a Raytheon spokesman said.

Firestone Plastics Unit Is Building Resins Plant

AKRON, Ohio—Firestone Tire & Rubber Co. said its Plastics division is building a polyvinyl chloride resins plant adjacent to an existing production facility for the material at Perryville, Md.

The new facility, scheduled for mid-1975 completion, will add about 50 million pounds annually to the capacity of the plant complex. When a previous expansion of the complex was completed in 1972, Firestone estimated the total capacity at 400 million pounds annually. Officials didn't disclose details of the current expansion.

Ammonia-unit corrosion cut

CORROSION-resistant systems are reducing plant shutdown and increasing effective production capacity in Venezolana del Nitrogeno C.A.'s ammonia units at El Tablazo-Zulia, Venezuela. The systems mitigate corrosion in the critical carbon dioxide removal process during ammonia production. Known as UCAR Amine Guard, the treatment passivates steel in units where monoethanolamine is used to remove CO₂. It was developed by Union Carbide Corp.

One of the two 900-metric-ton/day ammonia units, which has been in operation for some time, was treated with Amine Guard in October 1973. The second, a new unit, was treated in March 1974. *87-005 END*

New Louisiana gas may go for \$2/Mcf

A PRICE in excess of \$2/Mcf may be around the corner for new gas reserves in southeast Louisiana.

Ken G. Martin, president of Martin Exploration Corp., Metairie, says negotiations with five municipalities and four chemical plants for new and undedicated reserves probably will result in a price of more than \$2/Mcf.

The company has 13.7 MMcfd of total deliverability from four properties, Martin says. Most of it is within 20 miles of the west bank of the Mississippi between Donaldsville and New Orleans. He estimates reserves

to be more than 100 billion cu ft.

Meanwhile, gas prices in old contracts for intrastate sale in South Louisiana also are being adjusted upward.

Royalty owners in Lawson field in Acadia Parish say Cities Service Oil Co. has adjusted prices upward to 50.9¢/Mcf from 27¢ for Sept. 1, 1973 through Dec. 31, 1973.

And adjustments for gas sold since Jan. 1 will move prices up to 94.1¢/Mcf. Louisiana independents report another major company also has made voluntary adjustments.

Goodyear, Borden Sued for \$284 Million Over Polyvinyl Chloride Meat Wraps

By a WALL STREET JOURNAL Staff Reporter

CLEVELAND — A class-action suit against Goodyear Tire & Rubber Co. and Borden Inc. asking \$284 million in damages resulting from supermarket use of polyvinyl chloride meat wrap was filed in Cuyahoga County common pleas court here.

The complaint was brought by Florine Schultz, a former meat wrapper for Pick-n-Pay supermarkets, a Cleveland-based chain. It asks \$1 million in damages for

Mrs. Schultz and at least 283 other meat wrappers employed at 71 Cleveland-area Pick-n-Pay stores, since the chain began using polyvinyl-chloride wrap in 1967.

The suit charges that the meat wrappers "endured chronic exposure to dangerous air contamination from thermal decomposition of polyvinyl-chloride films as it passed over an electric heat wire being used to cut said wrap for packaging," and that the exposure has caused respiratory, skeletal and cardiac injuries. The markets, the suit states, have used Prime wrap, a packaging film made by Goodyear, and Resinite, a Borden product.

In Akron, a Goodyear spokesman said, "Although we haven't been presented with a copy of the complaint, we are prepared to vigorously defend suits of this type." A Borden official also indicated the company hadn't received a copy of the complaint, and said public statements by Mrs. Schultz's attorney that there is a medically proved link between use of the wraps and physical injury are "without foundation."

The federal government this spring imposed strict regulations on exposure to vinyl-chloride fumes in plants making PVC, a solid plastic with many industrial and consumer applications, after exposure to the gas was linked to liver cancer among workers at certain plants. The supermarket meat wraps are made from a PVC resin.

The suit alleges that "as a direct result of inhalation of the highly toxic films" from cutting the meat wrap, "plaintiffs have incurred extremely irritating damage to the skin, eye, nose, and throat along with shortness of breath, coughing and general respiratory distress, which eventually leads to serious skeletal deterioration with permanent cardiac and brain injury."

Mrs. Schultz's attorney cited a University of California at Los Angeles study reported last November linking fumes from PVC wrap to respiratory ailments.

The attorney said that others exposed to PVC or vinyl-chloride fumes in use or manufacture of other PVC products may later be added as plaintiffs in the suit. He also said other manufacturers of PVC products might be added as defendants, but indicated Mrs. Schultz hasn't any interest in suing the Pick-n-Pay chain, a subsidiary of Cook United Inc. until 1972, and currently privately owned.

In Chicago, a spokesman for the Amalgamated Meatcutters and Butcher Workmen of North America said the union has been concerned for some time about possible dangers connected with wrappers and has discussed PVC products with several manufacturers.

Robert Vandervort, an administrator for the National Institute for Occupational Safety and Health, said institute studies have linked use of the film to minor upper respiratory ailments, but that a connection hasn't yet been established between the wrap and more serious respiratory injury or other major illnesses.

Mr. Vandervort also indicated that PVC represents only a small proportion of fumes given off when the wrap is cut, and that much of the gas is a plasticizer, DI-2-ethyl hexyl adipate. He said that studies haven't pinpointed what chemical causes injuries, but that "probably both" are deleterious.

The institute is preparing recommendations.

Goodyear Plans to Expand Resin Plant for \$10 Million

AKRON, Ohio—Goodyear Tire & Rubber Co. said it plans to spend \$10 million over the next two years to significantly expand production of polyester resin at its plant in Point Pleasant, W. Va.

Goodyear said the expansion is in anticipation of continued market growth for polyester resin, used in tire cord, textile fibers, monofilament products and other goods. *87-005 END*

Reichhold Chemicals Inc. (White Plains, N.Y.)—Homer Dunnison, T. R. McGraw, Joseph Sisti and O. U. Thomas were elected vice presidents of this synthetic resins producer. *87-005 END*

Agrico and Farmland Industrial plan to build an ammonia plant in Oklahoma. Capacity of the joint-venture operation will be 1,200 tons/day, with gas feedstock to be supplied by Oklahoma Natural Gas Co. Most likely location, according to trade sources, is Enid, Okla., where Farmland started up a similar unit in mid-July (CW, July 17, p. 42).

8-28-74

P9

Market newsletter

September 4, 1974 — CHEMICAL WEEK

CW
9-4-74 P17
Tenneco has joined other producers in raising methanol prices. The company last week posted a Gulf Coast price of 32¢/gal. and moved up the quote at its major terminals to 37¢/gal., effective Sept. 1. Its highest tab is 42¢/gal., at Pine Bend, Minn. Tenneco also hiked formaldehyde tabs, to 3.5¢/lb., f.o.b. Fords or Garfield, N.J. More methanol capacity may be announced soon. Trade sources say that two major producers plan about 4,500 tons/day of new capacity.

Robintech develops safe PVC process *8-9-74 P23 ECW*

ROBINTECH Inc. of the USA has been notified by the US Patent Office that the patent on its Rocor IKC process for PVC manufacture will be granted within the next 90 days. The process is claimed to eliminate vinyl chloride monomer exposure of workers in the production facility, and therefore avoid liver cancer hazard which is currently plaguing PVC producers.

The IKC (In-Kettle Compound) process is used in existing Robintech PVC plants and a new 90,720 ton/year (200m. lb/year) joint venture facility with Shin-Etsu of Japan is currently being constructed at Freeport in Texas, and is expected to be on-stream this month.

Apache Unit Tests Gas Well *P22*

TULSA—Apexco Inc. said it successfully tested a wildcat as a natural gas discovery in Eddy County, N.M. Apexco, which is 58% owned by Apache Corp., said the well flowed at a rate of 2.2 million cubic feet of gas a day, plus some oil-like condensate, on a production test through a 14-64-inch opening. Perforations were in the Morrow zone at depths between 11,958 and 11,968 feet.

Apexco said it owns a 37.5% interest in the well and is preparing to drill a wholly owned well on an adjoining 3,000-acre tract. Chesapeake holds the remaining interest in the discovery well.

Mitchell Energy Completes Gas Discovery Well

HOUSTON—Mitchell Energy & Development Corp. said a subsidiary completed a natural gas discovery well in the Mesquite Bay of Aransas County near the south Texas coast.

The well, on a 3,663-acre block, was completed in the upper Frio sand formation. The company said it produced gas at the rate of 1.6 million cubic feet daily through a 12-64-inch opening from perforations at depths of 9,472 to 9,488 feet. Another interval in the same formation tested gas at about the same rate, Mitchell Energy added. Other intervals in the well, which was drilled to a total depth of 12,500 feet, also may be productive, the company said.

The company said the nearest production to the discovery is five miles to the northwest. More drilling in the area is planned next spring, Mitchell Energy said, adding that it is negotiating to sell gas from the discovery well.

Mitchell Energy is operator and holds a 35% working interest in both the well and the lease block. Other partners are Southern Union Production Co., 71%-owned by Southern Union Gas Co., with 35%, and a unit of Gulf Oil & Refining Corp. with 30%.

P9 *H8J*
9-12-74

FPC limits operators' use of own gas to 20%

THE Federal Power Commission will allow U.S. operators to use no more than 20% of new offshore gas production in their onshore refineries or petrochemical plants.

This policy decision, whittling down the "Chandeleur incentive," came in a case involving three producers who sought to use 50% of their new offshore gas in plants onshore. It appears to set the pattern for FPC action in similar cases pending before the commission (see story p. 50).

FPC also will require producers to phase out burning of gas as boiler fuel shortly.

The opinion was by Comm. Don S. Smith, joined by Chairman John N. Nassikas. Comm. William L. Springer issued a separate concurring statement, but questioned whether any of the gas should go to the producer's facilities when consumers of the "highest priority" are told that gas is not available.

FPC authorized three interstate pipelines to transport the gas for the producers from offshore leases to onshore refineries and petrochemical plants.

Sea Robin Pipeline Co. and United Gas Pipe Line Co. were cleared to transport gas from offshore leases of Exxon Corp. to the producer's refinery and chemical plant at Baton Rouge.

Tennessee Gas Pipe Line Co. was authorized to move gas for Continental Oil Co. and Cities Service Oil Co. to their Lake Charles, La., refineries and chemical facilities.

Sea Robin and United will deliver in addition 5 MMcf of gas to Exxon's account at oil-field points in Louisiana and Mississippi for use in well injection and oil treatment.

P46

THE OIL AND GAS JOURNAL—APRIL 28, 1975

The balance of the gas must be sold to the interstate pipelines.

FPC reported the three producers' daily refinery and chemical-plant requirements for gas in existing facilities total 612,400,000 cu ft, including byproduct gas. Conversion to oil at these plants would cost Exxon \$79.9 million, Cities \$10 million, and Continental \$3-\$3.5 million, the commission estimated. These figures exclude lost production time, increased operating expenses, air pollution, and decreased thermal efficiency.

FPC sharply revised the doctrine

laid down in 1970 in the Chandeleur Pipe Line Co. case, allowing the California Co. to ship 100% of production from certain offshore leases to an affiliated refinery at Pascagoula, Miss.

FPC then decided that the possibility for use in its own facilities would provide incentive for producers to explore for additional gas to avoid use of more costly alternate fuels. This incentive, FPC suggested then, could outweigh a possible superior use of the gas.

The latest decision trims this incentive markedly.

Vinyl chloride monomer price going up at PPG

CW P-21 6-475

PPG Industries' Industrial Chemical Division is increasing the price of vinyl chloride monomer by 1¢/lb. effective June 1 on spot sales and by July 1 on contract sales. Current industry quote on VCM is 10-12.5¢/lb.

Getting VCM off the PVC: Tenneco guarantees 10 ppm. maximum residual

P 27
4-30-75
CW

Maximum vinyl chloride monomer content of 10 ppm. on all homopolymers, dispersion-grade and blending resins has been guaranteed by Tenneco Chemicals. Use of these resins by fabricators means that VCM exposures in work areas will be below the Occupational Safety and Health Administration's action level of 0.5 ppm., according to the company's president, Raymond Marks. The same cannot yet be said for Tenneco's copolymers. Key: proprietary kettle cleansing and monomer evacuation techniques Tenneco has developed in conjunction with startup of its new, 250-million-lbs./year PVC resin plant in Pasadena, Tex., equipped with 35,000-gal. tanks developed by Shinetsu Chemical Industry (Tokyo).

TEN 2620

Georgia-Pacific Says Vinyl Chloride Level At Plant Meets Curbs

Company Claims Its Process Cuts Emission of Gas, Linked to Liver Ailment

5-23-75 p 5

By a WALL STREET JOURNAL Staff Reporter
PORTLAND, Ore. — Georgia-Pacific Corp. claims that it has solved vinyl chloride pollution problems at its new polyvinyl chloride plant in Plaquemine, La.

Vinyl chloride is a gas used since World War II to make polyvinyl chloride, or PVC, a solid plastic with wide industrial and consumer application. Last year, the gas was linked with a rare and usually fatal form of liver cancer, gliosarcoma. To protect workers in plants where the gas is produced, the Occupational Safety and Health Administration ordered companies producing PVC to hold vinyl chloride levels in the air workers breathe to a maximum of one part gas per million parts air in an eight-hour period.

Georgia-Pacific said its new, highly computerized production facility meets the regulations. "The process here results in an unusually low level of residual monomers normally remaining in PVC, thus reducing pollution problems in fabricator plants where the resins are reheated to make vinyl products," T. Marshall Hahn, executive vice president, said.

Major customers for the PVC resin include manufacturers of PVC pipe and fittings, electrical conduit, electrical wire coatings and similar products, the company said.

The plant is expected to run at its capacity of 110,000 tons annually by the end of the year, Georgia-Pacific said.

Dow Chemical Unit to Build Two Plants in Louisiana

MIDLAND, Mich. — Dow Chemical Co. said its Dow Chemical U.S.A. division plans to build two plants at its Plaquemine, La., facility to produce petrochemical products.

The company declined to give the cost of the project, due to be completed in 1978. The plants will make alkanolamines and glycol ethers.

► A joint wildcat some 100 miles south of Port Arthur, Tex., has scored another gas discovery in the Gulf of Mexico Pleistocene trend. The lease line well establishes gas pay under two tracts—High Island A-270, owned by Tenneco Oil Co. 45%, Chevron Oil Co. 45%, and Samedan Offshore Corp. 10%; and High Island A-269, a 100% Shell Oil Co. block. Tenneco drilled the 1 OCS-G-2724 to 8,848 ft A-270 in approximately 160 ft of water. Test results were not revealed. p 49 5-12-75

PPG Vinyl Chloride Monomer Will Cost 1 Cent a Pound More

pg 5-30-75

By a WALL STREET JOURNAL Staff Reporter
PITTSBURGH—PPG Industries Inc. said it is raising prices on vinyl chloride monomer one cent a pound.

The new prices are effective Sunday on spot sales and July 1 on contract sales, PPG said.

Vinyl chloride monomer currently sells on long-term contracts in the range of 10 cents to 12½ cents a pound. PPG attributed the increase to "continually increasing cost pressures."

Vinyl chloride monomer is the key substance in making the nearly 5.5 billion pounds of polyvinyl chloride plastic used annually in the U.S. One of the most widely used of plastics, it is used in plastic pipe, floor tiles, home siding, furniture covers, wire coatings, phonograph records and hundreds of other products.

Presumably, one of the upward pressures on costs of making vinyl chloride monomer is the recent order of federal occupational health authorities for industry to drastically reduce worker exposure to vinyl chloride gas. Long-term exposure to the gas has been linked with a rare cancer of the liver. Plastic-industry officials have claimed that the cost of meeting the new standards would be so great as to be "economically unfeasible." The new standards, effective last April 1, were recently upheld by the Supreme Court.

Coquina Oil Boosts Natural Gas Prices

It Charges 2 Firms

p 12 5-17-75

By a WALL STREET JOURNAL Staff Reporter
MIDLAND, Texas — Coquina Oil Corp.

said it renegotiated contracts to increase its price for natural gas produced from two fields.

Coquina said it increased to \$1.80 a thousand cubic feet from \$1.30 the base price it charges Lo-Vaca Gathering Co., a unit of Coastal States Gas Corp., for natural gas from the Conger gas field in Sterling County, Texas. Coquina holds a 22% interest in that field. Including adjustments for heating value, the new price amounts to \$2.02 a thousand cubic feet and is retroactive to May 1, the company said.

Coquina also said it increased to \$1.50 a thousand cubic feet from 80 cents the price it charges Oklahoma Natural Gas Co. for gas from the Ardmore gas field in Carter County, Okla. Coquina has a 15% interest in that field. The \$1.50 price is retroactive to April 24, Coquina said.

In addition, Coquina said that because of the volume of production from the two fields, which it declined to state, its management believes the price increases will "significantly increase" future earnings, beginning in this year's third quarter.

Shortages of Gas In Winter Are Seen By Pipeline Firms

p 17 5-9-75

By a WALL STREET JOURNAL Staff Reporter
WASHINGTON — Interstate natural-gas pipeline companies are predicting shortages of up to 2.9 trillion cubic feet of gas next winter, according to the Federal Power Commission.

This would be 45% greater than the curtailment during the 12 months ended March 31, which the FPC said totaled two trillion feet of natural gas.

The FPC also reported that natural-gas reserves committed to interstate pipeline companies fell 14 trillion cubic feet last year, the seventh consecutive year to show a decline.

A House Commerce subcommittee opens hearings today to investigate natural-gas supplies and curtailments to see if the shortage is, in the words of one subcommittee staffer, "fact or fiction."

The study by the FPC's Bureau of Natural Gas shows projected curtailments in natural-gas deliveries next winter by 29 of 48 major interstate pipeline companies. The states expected to be hardest hit by curtailments, according to the FPC study, are Delaware, Kentucky, Maryland, New Jersey, New York, Virginia, West Virginia, Ohio, Pennsylvania, Texas, Arkansas, Louisiana and Mississippi.

"This study just confirms what we've been warning for months: There's a bad shortage coming this winter," said an FPC spokesman.

Diamond Shamrock Plans Polypropylene Resin Plant

5-16-75
CLEVELAND — Diamond Shamrock Corp. said it plans to build a polypropylene resin plant adjacent to an existing facility near Houston at a cost of more than \$50 million.

The company said the new plant, which is slated for completion in late 1977, will have an annual capacity of 240 million pounds, increasing the company's capacity for the resin to 400 million pounds a year. Polypropylene resins are used in making carpeting, film, containers, medical products such as syringes and other products.

Diamond Shamrock is a diversified chemicals and petroleum producer.

Co-noco Chemicals is shifting headquarters to Houston from Saddle Brook, N.J., effective Aug. 1, mainly to gain better access to feedstock supplies. 5-14-75

PVC plants are ready to pass first test

Vinyl chloride monomer emissions have been cut to less than 25 ppm. to meet OSHA standard. Most producers are working on additional improvements needed for 1976

Manufacturing methods for limiting exposure to vinyl chloride monomer are about to meet their first test. Last month the standard limiting VCM exposure to 25 ppm. went into effect and an inspection program directive was issued to regional offices by the Occupational Safety and Health Administration.

Indications are that plants should pass inspections with relative ease. But they appear to be only the warmup for sterner tests in the future. Unless the Supreme Court intervenes, a 1-ppm. exposure limit will become the standard in April 1976. The high court has already refused to deny standards and is not likely to hear further arguments against a Court of Appeals decision upholding the standards *CW, Feb. 12, p. 12*.

In addition, the Environmental Protection Agency by next month is expected to propose standards limiting VCM emissions to the atmosphere. (EPA hasn't indicated what the standard might be, but vinyl producers believe it may be 400 ppm. and the Food and Drug Administration probably will adopt a limit of "no detectable level" for VCM migration for foodstuff-grade packaging.

Meeting the Standard: For the moment, plants seem to be complying with the present 25-ppm. exposure standard. For example, John Nelson, Goodrich chemical's vice-president for manufacturing, reports his company's plants are operating at about 6 ppm. or less on a time-weighted average. A Union Carbide spokesman says VCM exposure average about 5 ppm., although "the alarm bells still ring"—a warning to workers to use protective masks because the level has reached 25 ppm.

Daniel Boyd, director of OSHA's standards development office, says he senses a "air of optimism" among producers in compliance with the 1976 standard of 25 ppm. However, the key question is: how much use will have to be made of respirators?

Respirator manufacturers tell Boyd at "business is lousy." And Robintech president Stewart McCambridge says in a new joint-venture plant with Japan's Shinetsu at Freeport, Tex., already is meeting the standard without the use of respirators.

On the other hand, Tenneco Chemicals

President Raymond Marks says there is "no way" his company will be able to meet the standard without respirators, although the same Shinetsu technology will be used at its 250-million-lbs./year plant at Pasadena, Tex.

Says Harry Connors, general manager of Diamond Shamrock's plastics division: "No one will meet the 1-ppm. limit 100% of the time without respirators, despite what Robintech says."

And whether some of the older plants with smaller reaction vessels can survive once the 1976 standards go into effect will depend on new production technology that most vinyl chloride producers are now attempting to develop.

Optimists point to progress the indus-

\$42 million during a three-year period to protect workers from VCM emissions.

New Plants: One good indication of producer optimism is the expansion of polyvinyl chloride capacity that is under way. (Producers also seem to agree that new process units are probably more easily controlled for VCM emissions.) In addition to the new Shintech plant, new capacity includes Conoco Chemicals' expansion to 500 million lbs./year at its Aberdeen, Miss., plant; Borden's addition of over 200-million-lbs./year capacity at its Illiopolis, Ill., plant; Diamond Shamrock's 200 million lbs./year at Deer Park, Tex.; and Goodrich's new unit being built at Louisville, Ky.

All this new capacity is not a fixed figure. "It depends on how much we can reduce residual VCM," says Ken Schurter, Conoco Chemicals business area manager for PVC.

For one thing, polymerization of VCM is a batch operation. Getting maximum monomer reaction and then removing residual VCM from the vessel takes a long time. With increased onstream capacity and a soft market, PVC producers are finding they have more time to strip VCM from the polymer. Whether they will be happy with the long batch times when the market picks up remains to be seen. But FDA's concern about residual VCM in food packaging will keep the pressure on producers.

Residual Removed: Tenneco says maximum residual on all homopolymers, dispersion-grade and blending resins is 10 ppm. The company has achieved 98% VCM removal for 85% of the 30 polymer grades it makes, according to Vice-President Joseph Fath. Robintech also says its polymers are at 10 ppm. And Goodrich's Nelson says VCM residual has been reduced to 10 ppm. for 90% of the company's polymers.

The catch is the remaining 10-20% of the polymers. Tenneco, for example, can't yet guarantee 10-ppm. residual VCM on copolymers, which is 22% of its business.

It's much more difficult to remove unreacted VCM—which amount to 3% of the initial charge—from low-molecular-weight resins. "To get a low stripping level on a general-purpose, dry-blend homopolymer may take half hour, but



Photo: Business Week—Henry Groskinsky

MANUAL CLEANING of reactors has been reduced 90% by installation of new units.

try has already made in stripping unreacted monomer from the polymer, in reaction vessel cleaning methods that reduce the number of manual cleanouts, and in development of larger vessels that appear to reduce emissions.

Industry already has spent millions on development work and, according to the Society of the Plastics Industry, will be spending up to \$200 million on additional process improvement techniques. Goodrich, for example, says it will spend

with a copolymer it could take all day," says one producer.

Reactor geometry that is favorable for agitation and heat exchange is not the most favorable for stripping because of the low ratio of free area to liquid volume. Producers traditionally have relied on a second vessel for stripping. They are now using steam jets and vacuum pumps, also are applying heat (live steam) to increase the partial pressure of the VCM. "Stripping studies are the area with the biggest potential payoff," says a Union Carbide manager.

Big Reactors: The use of large reaction vessels is said by some companies to be a major step forward in PVC technology. Shinetsu has developed 35,000-gal. reactors and other manufacturers are pursuing large reactor technology to ease the VCM emission problem.

At present, 30% of industry capacity is said to be in reactors smaller than 2,500 gal. and 70% of capacity in reactors smaller than 5,000 gal. But Tenneco Chemicals' Marks calls this "yesterday's technology" and predicts large reactors (over 18,000 gal.) will produce some 1 billion lbs./year—16-20% of industry ca-

capacity—by the end of the year.

Conoco has developed its own technology for the four 20,000-gal. reactors installed at Aberdeen. Borden has built 20,000-gal. vessels, using Monsanto technology, to supplement its less-than-8,000-gal. reactors at Illiopolis. And Diamond Shamrock's new vessels at Deer Park are large, although not as big as Shinetsu's. Four 50,000-gal. reactors built by Huels at Marl, West Germany, are the largest that have been built so far.

These large reactors have fewer connections, thus fewer potential leaks. They also require less manual cleaning. Manual entry for cleaning has been cut 90% and only 25% of the personnel required for older plants are needed for plant operation, according to one company.

But so far, use of large reactors seems to be limited to certain resins—generally those used in the construction industry. Resins for electrical wiring, flooring or records, which must have no nonporous "fish-eyes," cannot be made in these vessels.

Cleanup: By automating processes, reducing workforces and improving tank cleaning methods, producers are cutting

worker exposure to VCM. For example, Tenneco's Fath says no manual cleaning is required at its new Pasadena plant. Manual cleaning is said to be "infrequent" in Conoco's new reactors and as little as once every 12 batches on small reactors.

Some proprietary cleaning methods also are available, but generally they involve high pressure (up to 10,000 psi.) cleaning with water or solvent.

Another area of development: so-called "clean wall" polymerization formulations that might reduce agglomeration on vessel walls. Shinetsu has come up with a variation of its own. It sprays the vessel walls with an unidentified material to prevent the polymer from sticking.

"We're scratching like hell," says one industry spokesman. And the scratching appears to be paying off. "It's a learning curve," says SPI. Although one company spokesman says the curve is asymptotic between 5 ppm. and 1 ppm. of VCM.

For the present, it appears respirators will be needed for many of the resins produced. But a way still may be found to make PVC plants emission free.

Polar payoff

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