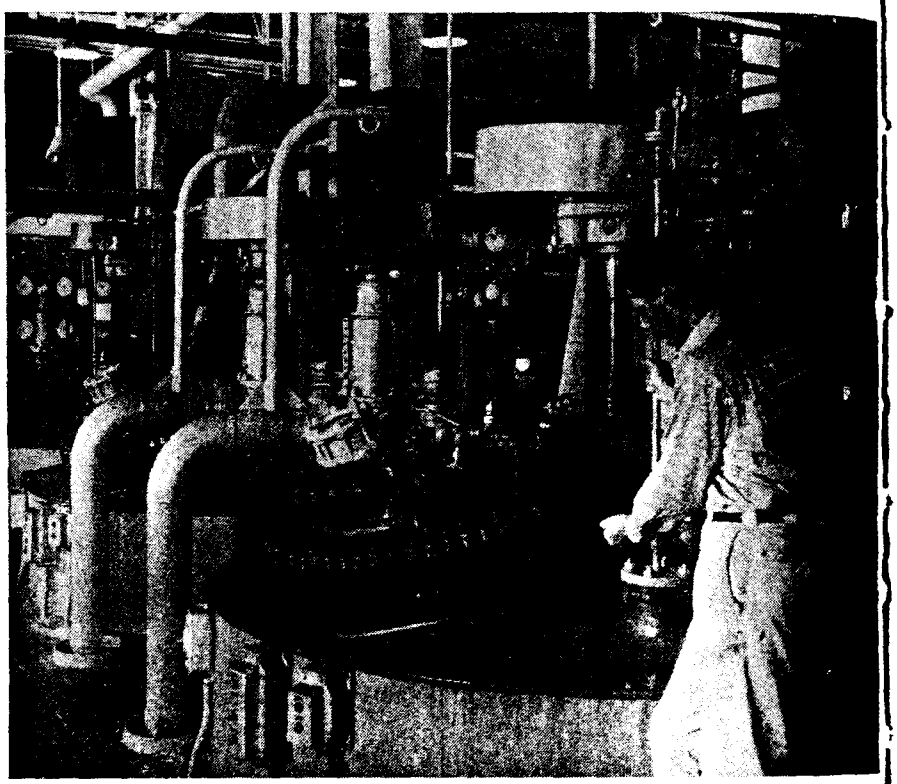
PVC producers see good business ahead

Optimism for polyvinyl chloride based on tight market, high plant utilization, increasing production, and firm prices

"Everything's tight. You can't buy monomer. You can't buy polymer. I'm afraid to answer my phone because I can't fill any more customer orders. And most other producers don't even have product to swap at market prices." That's how one polyvinyl chloride product manager sums up his view of the business.

Although the tight supply-demand balance is bringing some operational problems, it does, nevertheless, indicate that the 1969–70 business outlook for PVC producers is shaping into the healthiest one of the past three years. Assuming continuing growth in the nation's economy, the PVC outlook runs like this:

- The supply-demand balance will remain extremely tight through 1969 and moderately tight through 1970.
- Utilization of plant capacity will average 90% or more this year and next.
- Production will be up at an annual rate of 12%, to about 2.66 billion pounds in 1969 and 3.0 billion pounds in 1970.
- Price structures are generally firm and producers will likely announce price increases this fall for general-purpose resin now selling at 10.5 cents a pound in bulk.



PVC REACTOR. Firestone worker adjusts valve on 3500-gallon reactor in which vinyl chloride monomer is polymerized at company's Pottstown, Pa., plant

Polyvinyl chloride markets are more diverse than any other large-volume thermoplastic

Market	Consumption (per cent)
Calendering	18%
Extruded products	14
Wire and cable	12
Calendered flooring	10
Film and sheet	6
Paper and textile coating	5
Sound records	5
Plastisols	5
Protective coatings and adhesives	4
Injection and blow molding	3
Coated flooring	2
Other domestic uses	11
Exports	5

Given such good business conditions after the 1967–68 period of overcapacity and price cutting, producers are optimistic, but cautiously so, about the near-term outlook. Union Carbide's Gordon P. Bigelow, product manager of vinyls, expresses what seems to be the industry's mood: "There's a little life on the horizon . . . but there are indicators that the economy might slide."

Even if consumer demand for vinyl products is weakened for a short time, the resin outlook is still good, because the current shortage of monomer is the really critical factor in today's tight supply-demand balance. This shortage is limiting the production of polymer and will continue to limit it until mid-1970, according to all monomer producers. What will relieve this shortage about mid-1970 will be new monomer capacity, in particular Dow's 800 million pound-a-year Oyster Creek, Tex., plant, which the company began to bring on stream in June and will continue to increase to full capacity stepwise into next year.

The monomer shortage is somewhat puzzling, though, in view of what appears to be an industry overcapacity. A C&EN check of all monomer producers shows that their average operating capacity for 1969 is 4.0 billion pounds (excluding the Dow startup). At best, monomer production will approach 3.0 billion pounds this year, of which 90%—2.7 billion pounds—will go to domestic PVC makers, and 10%—300 million pounds—will go to currently strong export markets. Based on these figures, plant utilization for 1969 would be only 75%.

Monomer producers, however, claim that they're operating their plants all out. They estimate plant utilization this year at about 90%. This means that the effective operating capacity for 1969 must be lowered from 4.0 billion pounds to 3.4 billion pounds to arrive at the 90% figure. This is quite a drop from nameplate

capacity, but conceivable nevertheless, as producers continue to phase out acetylene units and overstate capacity to discourage competition.

The tight supply-demand balance monomer is supporting the market selling price of 4.5 cents a pound in tanks on long-term contracts. One downward pressure on this selling price is coming from the Federal Trade Commission's 1967 consent order which requires that Continental Oil make available for five years one third of its vinyl chloride production to nonintegrated PVC producers at the lowest price offered any other customers. Another downward pressure is the forecast for lower-cost ethylene at less than 3.0 cents a pound, even though prices for chlorine, which constitutes nearly 60% of the polymer weight, have recently moved up incrementally.

Slight discrepancy. While producers figure that plant utilization will be about 90% for 1969, there is a slight discrepancy between nameplate capacity and estimated production for 1969. A C&EN inquiry of all 23 PVC producers shows that the industry claims a year-end 1969 capacity of 3.7 billion pounds and an average operating capacity for the year of 3.2 billion pounds. These figures appear overstated, as do the monomer figures. It's likely that with production estimated at 2.66 billion pounds this year, average operating capacity will be about 3.0 billion pounds.

During the first four months of 1969, polymer production increased 13% over the same period last year, with some changes in the polymerization mix. Suspension homopolymer accounts for 68% of production so far this year, up from 63% last year. Suspension copolymer accounts for 18% so far this year, down from 23% last year. Dispersion (paste) resins remain unchanged at 14%. In spite of the generally good outlook, producers still have problems which they're worried about.

Wide mix. B. F. Goodrich, which makes about all types and grades of PVC resins, indicates concern about having to produce such a wide product mix.

Hooker's Bill Daly, business manager for chemicals and polymers, says that his company is worried that its three fastest growing markets—rigid specialties, packaging sheet, and casting—might slow down with the overall economy.

And about pricing, Dick Kulick, vice president of marketing for Tenneco's plastics division, comments that even with last January's price increases and with good growth this year, the company feels there should be more of an increase in the average selling price for its homopolymer resin mix.

Vinyl chloride monomer capacity will total 4.8 billion pounds at the end of 1969

Producer	Location	Capacity (millions of pounds)
Allied Chemical	Geismar, La.	300
American Chemical	Watson, Calif.	175
Continental Oil	Lake Charles, La.	600
Dow Chemical	Freeport, Tex.	180
	Oyster Creek, Tex.	800*
	Plaquemine, La.	300
Diamond Shamrock	Deer Park, Tex.	100
Ethyl Corp.	Baton Rouge, La.	300
	Houston, Tex.	200
B. F. Goodrich Chemicals	Calvert City, Ky.	1000
Monochem	Geismar, La.	300
PPG Industries	Lake Charles, La.	300
Tenneco	Houston, Tex.	255
Union Carbide	Texas City, Tex.	150**
	Total	**4,810**

* Dow just started up part of its Oyster Creek plant in June and is making shipments.
** Union Carbide will phase out its Texas City plant by early 1970 and purchase merchant monomer.

Polyvinyl chloride capacity will total 3.7 billion pounds at the end of 1969

Producer	Location	Capacity (millions of pounds)	
Airco	Calvert City, Ky.	120	
Allied Chemical	Painesville, Ohio	200	
American Chemical	Long Beach, Calif.	70	
Atlantic Tubing	Cranston, R.I.	100[a]	
Borden	Illiopolis, Ill.		
	Leominster, Mass.	250	(combined total)
Continental Oil	Aberdeen, Miss.	155	
Diamond Shamrock	Deer Park, Tex.		
	Delaware City, Del.	240	(combined total)
Escambia Chemical	Pensacola, Fla.	50	
Ethyl Corp.	Baton Rouge, La.	150	
Firestone Tire & Rubber	Perryville, Md.	115	
	Pottstown, Pa.	125	
General Tire & Rubber	Ashtabula, Ohio	75	
B. F. Goodrich	Avon Lake, Ohio		
			ombined total)
Goodyear Ti	Jeffersen		
Great Amer			
Hooker			
Keysor Chei			
Monsanto			
Olin			
Pantasote			
			ombined total)
Stauffer			
Tenneco			
Union Carbi			
			mbined total)
Uniroyal			

[a] Atlantic Tubing [illegible] operation as the result of a fire but the company plans to rebuild capacity—how much is still uncertain.
[b] Goodrich will have the Pedricktown plant on stream by the end of 1969.
[c] Goodyear will expand the Plaquemine plant to 80 million pounds a year in late 1970.
[d] Hooker will expand the Burlington plant to 120 million pounds a year in 1970.
[e] Stauffer will expand the Delaware City plant to 150 million pounds by the end of 1970.
Note: Dow Chemical will shut down its Midland, Mich., plant, rated at 60 million pounds a year, by the end of 1969 and thus end its PVC operations.

Tight monomer supply plagues PVC producers

Booming demand, low profit levels, and operating problems have teamed to create vinyl chloride shortage

Recently released Tariff Commission statistics confirm what vinyl chloride producers and consumers both know—monomer producers are running their plants all out to meet a growing demand that is being stimulated by the booming polyvinyl chloride plastics business. They also know that it is an uphill battle. As a result of operating problems late last year and again this year, the supply of vinyl chloride is extremely tight and it will remain tight at least until the end of the year, when Shell Chemical's 700 million pound-per-year plant is scheduled to go on stream at Norco, La.

According to the Tariff Commission, U.S. producers churned out 1.37 billion pounds of vinyl chloride monomer during the first quarter of the year. That is equivalent to an annual rate of 5.5 billion pounds, which adds up to a nifty 96% of present nameplate capacity. However, if the recent past is any indication, this enviable operating rate is one that cannot be sustained for long periods. Shell's new unit probably will arrive too late to be much help this year, which means that the current, in-place nameplate capacity of 5.73 billion pounds will be sorely pressed to produce the 5.5 billion pounds that is expected.

One possible way of filling the gap if additional operating problems crop up will be to cut back on exports. Vinyl chloride exports have been running better than 600 million pounds annually for at least the past three years (last year they were 621 million pounds).

Latest casualty among monomer plants is PPG Industries' 500 million pound unit at Guayanilla, P.R., where operations were disrupted by a combination of power failures and feedstock shortages. As C&EN went to press, official word from PPG was that the power problems continue to plague the southern coast of Puerto Rico and there was little activity at the three-plant complex at Guayanilla, which includes the vinyl chloride unit, an ethylene glycol plant, and a chlorine plant.

Meanwhile, PPG has signed an interim agreement with Commonwealth Oil Refining (Corco) that will make it possible for Corco to supply feedstock to their jointly owned olefins plant at Penuelas. This plant, which supplies ethylene feed for the Guayanilla vinyl chloride plant, has been shut down since April 13 because of a feedstock shortage and mechanical problems. The two companies (PPG and Corco) are in litigation over the values of the feedstocks, but the interim agreement, which will extend through the rest of the year and into 1974, if necessary, should clear the feedstock hurdle. The olefins unit was expected to be back in service in mid-May, but as this issue of C&EN went to press, it still was not operating. If PPG's vinyl chloride unit remains out or even on partial service much longer, a serious crimp will develop in the already tight supply situation that finds many polyvinyl chloride producers on allocation for their monomer.

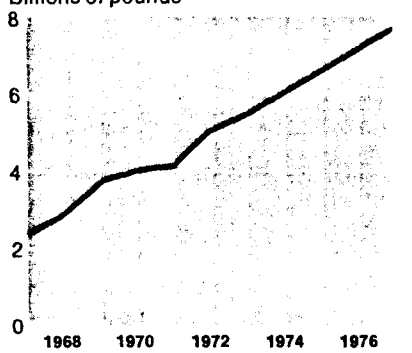
While the industry is watching what developments in Puerto Rico will do to the vinyl chloride supply situation, it must also face up to the task of building new capacity to meet demand projected four years from now. At the recent meeting of the Chemical Marketing Research Association in New York City, John D. Bryan, olefins manager for Conoco Chemicals, a division of Continental Oil, gave his ideas of how much new capacity will be needed and what kind of price will be necessary to provide an incentive for the investment. Mr. Bryan notes that over the past five years polyvinyl chloride production has grown just under 15% per year. Projecting growth through 1977 at a more conservative 10% annually, Mr. Bryan sees an annual PVC requirement of 6.8 billion pounds four years down the road.

Even assuming no growth at all in vinyl chloride exports, this 1977 PVC figure will require 7.7 billion pounds of monomer to sustain it. That's about 2 billion pounds more than existing monomer capacity and equivalent to 3.3 billion pounds of ethylene dichloride capacity, which now stands at 10.85 billion pounds. As Mr. Bryan sees it, the new capacity requirement for vinyl chloride will call for three new, 700 million pound plants, only one of which is now under construction—the one by Shell. Other companies, he says, undoubtedly recognize the need for additional vinyl chloride capacity, but producers have had such low returns on their existing units that they hesitate to make a similar mistake. Nevertheless, he feels that a decision will have to be reached by the end of this year in order to have a new, grass-roots plant operating by mid-1976 and effectively operating throughout 1977.

But Mr. Bryan thinks that it will take a 7 cent-a-pound price tag on vinyl chloride to justify building a new plant. Last year, spot prices ranged from 4.00 to 4.25 cents. And, although spot prices have now risen above the 5-cent list price, vinyl chloride still is moving at less-than-list under long-term contract. Based on energy values and installed capital costs at the time, vinyl chloride prices last year should have been 4.75 to 5.00 cents to provide an acceptable profit level, in his opinion. These prices are based on assumed energy value of 25 cents per million B.t.u. and capital costs for a balanced ethylene dichloride-vinyl chloride plant of about $4.4 million per 100 million pounds of vinyl chloride.

Mr. Bryan's 7-cent price projection also is based on the belief that fuel gas values on the Gulf Coast probably are going to rise to the 75 to 80 cents per

Output of vinyl chloride will require new capacity[a]...



a Current capacity is 5.73 billion pounds per year.
b Production. Sources: Tariff Commission, Conoco Chemicals estimates

... but new price will be needed for investment

	Cents per pound
Market price, 1972	4.25¢
Additional price needed for:	
Acceptable profit in 1972	0.55
Fuel cost increase of 50 cents per million B.t.u.	1.40
Capital charges cost escalation	0.80
New price	7.00

Source: Conoco Chemicals

million B.t.u. range over the next few years. This is a 50-cent increase over current values. If this increase is fully reflected through all energy and raw material costs, it would lead to an increase of 1.4 cents per pound in vinyl chloride prices.

Capital costs for building a new vinyl chloride plant also will increase. Mr. Bryan estimates that capital charges for a new balanced vinyl chloride plant coming on stream in 1976 will be about $5.4 million per hundred million pounds of monomer. These capital charges alone will increase vinyl chloride tabs by 0.3 cent and this ignores the capital charges that should also be included for new ethylene and chlorine investments. These would raise the price of ethylene and chlorine enough to justify an additional 0.5 cent to vinyl chloride's price, or a total of 0.8 cent per pound as a result of increased construction costs.

Current vinyl chloride capacity is close to 6 billion pounds

Million pounds per year		Capacity, 1973
Allied Chemical	Geismar, La.	300
American Chemical	Watson, Calif.	170
Conoco Chemicals	Lake Charles, La.	625
Dow Chemical	Freeport, Tex.	180
	Oyster Creek, Tex.	700
	Plaquemine, La.	340
Ethyl Corp.	Baton Rouge, La.	270
	Houston, Tex.	150
B. F. Goodrich	Calvert City, Ky.	1000
Monochem	Geismar, La.	350
PPG Industries	Guayanilla, P.R.	500
	Lake Charles, La.	300
[illegible] Oil	Deer Park, Tex.	840
TOTAL		5725

Source: Conoco Chemicals

Assuming that future vinyl chloride prices increase enough to warrant new capacity, producers still must face another set of problems. The 2 billion pounds of additional vinyl chloride capacity that is needed by 1977 will also require an additional 1 billion pounds per year of ethylene and 1800 tons per day of chlorine.

Mr. Bryan says that, optimistically, only 3.5 to 4.0 billion pounds of new ethylene capacity is expected to be on stream by 1977. Most of this new ethylene capacity already has been committed and, says Mr. Bryan, it is unlikely that much of it is committed to vinyl chloride because the contracts were signed when monomer prices were unrealistically low.

It is conceivable, then, that the combination of low profit levels, lack of ethylene, and large capital requirements may slow construction of new vinyl chloride plants. If this happens, says Mr. Bryan, the booming polyvinyl chloride business will be limited not by demand but by monomer supply.

Fight looms over Houston channel cleanup

Chemical and other industries located along the Houston Ship Channel are facing a difficult time in getting permits from the Environmental Protection Agency to discharge waste waters into the channel. At the first of a series of hearings to be held on various waterways, some company officials in Houston, Tex., told EPA officials that they cannot meet the requirements of proposed EPA permits. Others threatened court action to try to make EPA readjust permit requirements to conform with other EPA guidelines for waste discharges by industry.

The hearing seemed to settle nothing. However, it did point out how far apart industry and EPA are in their positions. And it indicated that resolution of these differences could well turn out to be a long and expensive business for the firms involved.

The basis for the action on the permits for the Houston Ship Channel is EPA efforts to further reduce the amounts of various wastes going into the key industrial waterway. As a result of earlier hearings on pollution of Galveston Bay by waste flushed down the Houston Ship Channel (C&EN, Feb. 21, 1972, page 12), EPA wants to limit the level of biochemical oxygen demand of discharges into the channel to 35,000 pounds a day.

The Houston hearings, which began at mid-month, involve directly only nine companies with plants or refineries located near the channel. Other companies will have hearings later. Each company had applied for a permit, although some intend to send their wastes to the regional Gulf Coast Waste Disposal Authority (C&EN, Feb. 5, page 16) and believe that they do not need a permit.

At the hearings, EPA officials offered proposed levels of waste to be permitted —levels which generally are to decline with time—and a possible timetable for additional facilities to handle the wastes. The companies countered by describing their problems in meeting the proposed permit requirements and questioned the validity of EPA proposals, the technical quality of methods cited by EPA officials for analysis and control of wastes, and the technical knowledge of some EPA officials.

During the early sessions, industry's efforts to reduce pollution of the channels received praise from some environmentalists. A Houston Sierra Club spokesman, Will Taylor, commended industry for helping to reduce the BOD of discharges to the channel from 100,000 to 45,000 pounds a day, and pointed to the city of Houston as the biggest polluter in terms of BOD. Murray Stein, the federal hearings examiner, retorted that "if we [EPA] had made as much progress with municipalities as with industry we would be a lot farther down the road."

Several of the companies whose permits were discussed, including Champion International, Crown Central Petroleum, Atlantic Richfield, and Petro-Tex Chemical, plan to send their wastes to the Gulf Coast Waste Disposal Authority and contend that they do not need a discharge permit. L. Jack Davis, GCWDA general manager, told the hearing that GCWDA had applied for a permit early in May, after having notified EPA of its intent to apply in February.

The reductions in the quantities of pollutants that may be discharged under permits proposed by EPA vary both in size and fraction. For instance, Ethyl Corp.'s Houston plant now discharges one stream of treated plant effluent and two cooling water streams that contain 3365 pounds of BOD a day and 13,611 pounds of chemical oxygen demand. Under the proposed EPA permit discussed at the hearing (Ethyl has filed an amended application), the company will be allowed to discharge until Dec. 31, 1974, BOD levels at an overall rate of 615 pounds a day as an operating average, 1230 pounds a day for any 30 days, and a maximum of 1845 pounds on a single day. After Jan. 1, 1975, the BOD levels will drop to 310, 465, and 620 pounds a day for each of the three categories. The reductions, as an operating average, run 81.5% through 1975 and 90.7% in 1975.

Clear definitions of operating average occupied several hours of the hearing's time. Other definitions led to long wrangling between EPA and company officials. As the hearings closed, definitions remained lacking in most cases.

Another thorny problem is what is meant by "best practical methods" in reference to handling wastes. Since the best practical method was never defined at the hearings, several company officials were forced to admit that their currently used treatment facilities or new facilities under construction or being designed might not meet the limits proposed in some of the permits. In commenting on the admission by Robert W. Maeser of Ethyl that a new facility coming on stream this August would violate the proposed permit, Mr. Stein, who heads EPA's water quality enforcement division, said that he could not recall a similar case in which the Government wanted immediate compliance with waste discharge standards. Other companies on the channel would receive various delays before having to meet proposed limits.

The next immediate step for the companies involved may be an appeal during a 10-day period following the recommendations of Mr. Stein to EPA. These recommendations are supposed to be made within 20 days after the hearings, but Mr. Stein delayed closing the hearings to let company officials examine EPA data.