

The Chlorine Industry: A Current Assessment

by Charles L. Mears
Senior Vice President & General Manager
Occidental Chemical Corporation

It's a pleasure to be here today. . . . for several reasons. First, since half of the PVC molecule is chlorine and because I spent many years in sales, I like to think I can still recognize a chlorine customer or at least a prospect. Second, you've heard the expression, "Misery loves company?" Well, I was looking for company. When I learned that for nearly 20 years, vinyl has been singled out as a bad actor by some environmentalists, I thought, "Where could someone involved in chlorine, which has been called 'the devil's element,' find a more understanding group of people?"

In all seriousness, thank you for the opportunity to be included in your program.

My purpose today is to briefly give you some idea of what's going on in the chlorine industry.

In the past, I would have approached a discussion of our industry primarily from the standpoint of markets, market share, capacity and production. In short, the typical business overview you might expect.

However, to properly understand the chlorine industry these days, it is important to focus on public perceptions, the key issues facing our industry, and the impact of these issues on the industry. For these issues are often the driving force behind the traditional industry measurements, and promise to remain so for some time to come.

To follow our industry today, pay attention to what the public is thinking; what issues we are now facing; how successfully we are dealing

with these issues; and the current and potential impact of these issues on our operations.

How does the public perceive us? In general, the news is not good.

Public opinion polls show that the average person has a low opinion of the chemical industry. Here in the United States, for example, only the tobacco industry is viewed less favorably.

The reason for this attitude on the part of the public can be summed up in one word -- the "environment." People are worried that their environment is becoming less safe, less habitable. And they are affixing the blame to chemicals.

A recent public opinion survey commissioned by the Chlorine Institute found that one-third of those questioned believe that environmental protection is worth any price, and seven out of 10 believe more needs to be done to protect the environment.

Surprisingly, the same survey found the opinion on chlorine is neutral. A majority believe that the benefits and risks are in balance. However, those conducting the survey warned that the opinion is tending downward.

One reason for this development is the increasingly antagonistic attitude of environmentalists toward chlorine. Greenpeace, for example, has made chlorine one of its prime targets as evidenced by its current "Chlorine Free by '93" campaign.

Previously, environmental attacks concentrated on chlorinated compounds such as dioxin and CFCs. Now the attention is centering on chlorine itself.

I should point out that Greenpeace is not an adversary to take lightly. They rank high in public opinion polls, which means the public is

receptive to their messages. In other words, they have credibility. Just as important, with an annual operating budget of \$100 million, they have the means to reach the public with their messages. And one of their primary messages at present is: get rid of all chlorine and chlorine-based industry.

Greenpeace is not our only adversary. Other environmental groups are also focusing on chlorine.

A few minutes ago, I used the phrase: "the devil's element." I borrowed it from the title of a TV documentary on chlorine, produced by the BBC, which was aired on the Discovery Channel in Great Britain and the United States.

Unfortunately, this is not an isolated instance.

Increasingly today, you can find articles like the one titled, "The Perils of Chlorine," which appeared in an Audubon Society publication.

Sadly, as we well know, these articles and programs are not objective, are not based on sound science, and do nothing to contribute to an informed discussion of important health and environmental issues. Yet this is the public opinion climate in which we now operate.

Before I turn to the issues affecting our industry, here's a look at the end uses for chlorine in the United States. (Figure 1) A similar pie chart showing world chlorine end uses would not be significantly different.

Now, let's review those issues.

In the pulp and paper industry, trace amounts of dioxin have been found in the effluent of some pulp and paper mills and in certain paper products. These levels of dioxin, a by-product of the chlorine bleaching process, are extremely low. Until recently, the technology did not exist to measure them.

Thanks to advances in chlorine bleaching technology, dioxin levels have been reduced from parts per million to parts per billion. Nonetheless, because of the public outcry, threatened lawsuits and regulatory activity, the paper industry, particularly in Europe and North America, is moving toward alternative bleaching processes based on chlorine dioxide, oxygen or hydrogen peroxide.

Historically one of our strongest markets, pulp and paper will account for only nine percent of world chlorine use in 1994, compared with about 11 percent in 1990 and 15 percent in the late '80s.

At present, chlorine is one of the most commonly used disinfectants in water purification. Over the years, it has proved its effectiveness in sterilizing water to prevent outbreaks of waterborne diseases such as cholera and typhoid.

Yet chlorine use for this purpose is currently being reevaluated by many municipalities around the United States. At issue is whether chlorine in water might react with organic compounds to form trihalomethanes, considered by some as suspected carcinogens.

Although studies are still underway, the chances are good that we will witness some legislation that will result in a shift away from the use of chlorine and toward the use of ozone or other alternatives in water treatment.

Another issue receiving considerable attention these days is that of chlorofluorocarbons, or CFCs. Developed to replace an earlier generation of highly toxic or flammable chemicals, CFCs are widely used as refrigerants and foam-blowing agents. However, in recent years, CFCs have been identified as a major factor in depletion of the ozone layer in the stratosphere and as a major contributor to global warming.

Consequently, CFC production has begun to decline sharply, due in large part to the Montreal Protocol. This international agreement, signed by over 30 nations, calls for cutting CFC production in half by 1998, and eventually phasing out production completely.

The cost involved in this phase-out will be enormous. One consulting group estimates the worldwide bill for full implementation of these measures will be \$100 billion.

As an alternative to CFCs, the industry has advanced the use of HFCs and HCFCs. But these too have come under attack by some environmentalists.

Chlorinated solvents, such as 1-1-1-trichloroethane, trichloroethylene, perchloroethylene and carbon tetrachloride, are also coming under increased scrutiny. Several have been associated with the ozone depletion problem or cancer in laboratory animals and a number of chlorinated solvents will eventually be eliminated. As a result, we have another market subject to serious erosion.

Because of chlorine's hazardous nature, the transportation of chlorine -- especially by rail -- is also an issue and some changes are being considered. Here in the United States, possible changes include re-routing shipments to minimize or eliminate chlorine's movement through densely populated areas, moving the cars at slower speeds to reduce the amount of damage in case of a derailment, and operating key trains, which would carry only hazardous materials.

The Department of Transportation is considering design modifications on chlorine tank cars, such as changes in steel type and thickness, coating the tank to prevent corrosion, improved thermal

insulation to protect the car from extreme heat, and the addition of half or full head shields to prevent end punctures.

Finally, we come to the PVC issue, which is not particularly new to this audience. Certainly we in the chlorine industry share your concern about environmentalist attacks on plastic, which range from the effects of incineration. . . . to their safety in packaging. . . . to their role in the waste stream.

This latter issue is particularly challenging because many consumers are wrongly convinced that plastics cannot be recycled and constitute the largest percentage of landfill space. The facts are that plastics can indeed be recycled and represent very little of the waste stream. PVC, for example, currently makes up less than one percent of municipal solid waste.

While some progress has been made in disabusing the public of its misconceptions, there is still a way to go to establish PVC as being as environmentally sound as alternative materials.

I'm sure that concerns you, as it concerns us in the chlorine industry as well. The fact is that PVC will essentially provide the backbone for chlorine's growth in this decade. We expect this market to grow at an annual rate of three percent, and to account for almost a third of all chlorine use within the next two years.

There are other issues concerning us. But, these are the major ones, the ones promising to dominate our foreseeable future. Five years from now, here's what the end-use picture for chlorine will look like. (Figure 2)

I've already alluded to some of the impact that these issues are having. Obviously, they will have a significant effect on supply and demand

equations, plant investment questions, rationalization decisions, and the like.

But they will also affect us in other ways as well, and in fact are already doing so.

To begin with, we have to become even purer than a political candidate in terms of operating our business in a safe and environmentally sound manner. While not usually being given credit, we've done a good job in this area. But, we have to do even better. We have to reduce emissions even further, and accidents in our plants, and on the roads and waterways must approach zero.

We must also go beyond basic chemical research and play a more active role in supporting or conducting science-based research on chlorine and chlorinated products.

Let me give you a specific example.

In 1989, the Danish government published a study claiming that PVC was the major cause of emissions leading to dioxins and acid rain. The findings of this study, which is the most recent on PVC, have been rejected by the scientific community, but our opponents continue to cite them in order to influence public opinion.

As an industry with a lot of its eggs in the PVC basket, we need to consider becoming involved in these kind of research projects -- independently or in partnership with other stakeholders, such as the Vinyl Institute.

All too often, we in the chlorine industry have been reluctant, or too slow, to defend ourselves against our critics. On too many occasions, we've elected to sit back and let the chlorine user fight the battle.

That's what we did in the case of pulp and paper. When the controversy surfaced, we had neither the facts nor the inclination to challenge the critics opposing the use of chlorine as a bleaching agent. In the end, the pulp and paper industry moved toward the use of chlorine alternatives and everyone lost.

The chlorine industry suffered major erosion in one of its prime markets.

The pulp and paper industry was forced into spending millions on new equipment. Expenditures that do nothing to improve productivity, lower operating costs or improve their competitive position.

And, the consumer lost as product quality suffered and prices increased. And, ironically, there is no scientific proof that he or she is any bit safer by being shielded from these infinitesimal amounts of dioxin.

If any good came out of this experience, it was the lesson that we have to act in concert -- producers, packagers and users. And that, working together, we must take the initiative in defining the issues instead of letting our opponents do so.

We're attempting to do that. For example, the Chlorine Institute has launched an outreach program that is much more than a reaction to attacks from chlorine critics. It is a comprehensive plan, designed to educate federal and state legislators and regulators, industry employees, customers and the public on the important role of chlorine in society.

The program's overall theme is: "Chlorine Does a World of Good." It centers around five key messages.

One. Chlorine provides many public health benefits as a water disinfectant, in antiseptics, medicines and crop protection.

Two. Chlorine is a key chemical building block, making today's high standard of living possible and providing everyday conveniences or societal benefits often taken for granted.

Three. Safety is a top priority. The chlorine industry works diligently to safeguard its employees, customers, communities and the environment.

Four. Science should be the basis for legislative or regulatory decisions concerning chlorine use, whose benefits far outweigh its risks.

And five. The chlor-alkali industry is responsible, both socially and environmentally.

The cornerstone of the program is a grass-roots effort to provide employees, customers and plant communities with accurate information on chlorine and its benefits, and to encourage those advocates to speak out on behalf of chlorine chemistry.

The worldwide chlorine industry is in the midst of some significant structural changes -- changes that will affect both producers and consumers.

In the developed countries of the world, chlorine is in the mature stage of its life cycle, with consumption growing at around one percent or less per year. That modest growth will depend on steady worldwide demand for EDC and VCM. By 1994, world chlorine demand should reach about 38 million metric tons per year, up from 36.5 million metric tons in 1991.

Chlorine capacity will not change significantly. What little capacity is added, will come primarily through incremental expansions and debottlenecking. In developing countries, where markets are growing more rapidly, some investments in new plants are possible. These

expansions may come at a time of lower ECU values -- relative to those of 1980, for example, but also at a time of lower energy costs. If energy costs go up and these increased costs cannot be recovered in the marketplace, we may see another shakeout like the one that occurred during the last energy crisis.

Because of reduced use of chlorine, particularly by the pulp and paper industry, we may see some industry rationalization. Some shutdowns have already been announced for the Western United States and Canada. Also, high energy costs, along with increased pressure by environmentalists, may force some companies in Europe to shut down their chlor-alkali operations.

Older technologies, such as mercury cells, will continue to be upgraded with newer, more efficient technologies such as membrane cells. This is particularly true in Europe, where about 75 percent of chlorine production is mercury cell-based and may be phased out. The economics of this phase-out will determine whether existing mercury cells will be replaced with newer technology or permanently closed.

The growing supply of chlorine in the developed regions of the world, combined with the growing demand for chlorine and products made from chlorine in developing regions, will intensify competition in an already competitive industry. That competition will be increasingly global in nature.

And, of course, environmental issues will continue to impact the industry -- primarily in a negative fashion. The environmental debate, which has been concentrated in Europe and North America, will inevitably spread to developing countries, where chlorine will face increased public opposition, as well as legislative and regulatory restrictions.

Yet, tide may be turning. While people are still highly concerned about the environment, a more rational discussion of the issues may be possible, given current economic stresses.

Recently, the Wall Street Journal carried an op-ed piece noting that the U.S. Department of Health will hold hearings on an announcement in the Federal Register of July 17. The announcement, said the writer -- a former director of the National Cancer Institute -- amounts to an official admission that many substances tested and listed by the National Toxicology Program, or NTP, are improperly classified as carcinogens.

The Federal Register announcement stems from an advisory review by NTP's Board of Scientific Counselors. In one section, the review states, "It should be noted that approximately two-thirds of the NTP carcinogens would not be.... considered as carcinogens, if the maximum tolerated dose was not used. The implicit assumptions underlying extrapolation from the maximum tolerated dose.... do not appear to be valid."

Perhaps we are moving after all into a period of more sensible discussion in which scientific facts, rather than politics and emotion prevail.

In the meantime, there are four things we need to do. First, we need to invest the time and money on chlorine and PVC research in order to expand our base of scientific data. Second, when this scientific data reveal problems with our products or processes, we need to acknowledge these problems and take the appropriate corrective action. At the same time, we need to defend our products and processes vigorously when science gives them a clean bill of health. Third, we need to be more proactive in telling our story, especially to the general public, who ultimately determines whether we will continue to operate. And fourth, we need to realize that all

these efforts must be sustained over the long term; they are not short-term solutions to our current situation.

In any event, the coming years promise to be among the most challenging our two industries have encountered, We face serious issues. But, I'm confident that working together, we can resolve them and succeed.