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in strictest confidence ... The chemical industry's secrets / HIGH-LEVEL CRIME / Italy develops a case for manslaughter because workers breathed *vinyl chloride*

By JIM MORRIS
Staff

VENICE, Italy - In America, the allegation would be gross negligence. The proceeding would be civil, not criminal, and only money would be at stake.

In Italy, the willful exposure of workers to cancer-causing chemicals has been given another name: manslaughter.

Thirty-one former executives of two Italian chemical companies are standing trial and may go to jail for ignoring warnings and allowing their employees to breathe horrific amounts of *vinyl chloride* and its relative, ethylene dichloride, inside a plant at Porto Marghera on the western shore of the Venice Lagoon.

"Cagionavano il delitto di strage," the indictment reads. "They caused the crime of massacre."

More than 150 former workers at the plant - owned first by Montedison, then Enichem - have died of cancer since 1973, and another 600 or so are thought to be suffering from work-related illnesses.

The defendants also are accused of polluting the lagoon with dioxin, a powerful carcinogen.

"People still collect shellfish from the lagoon and sell it to restaurants in Venice," said Fabrizio Fabbri, a Rome-based organizer for the environmental group Greenpeace. "The bottom sediment is like a slimy, black tar."

The trial, a criminal proceeding that also holds the possibility of civil damages, began in March and is expected to last a year. It already has had an impact.

In late May, most of the 500 or so individual plaintiffs in the case - sick workers and relatives of those who died - accepted a \$36.5 million settlement offer from the two companies, a development that all but emptied the courtroom. It was an extraordinary concession on the part of Italian industry.

"Social consciousness is changing," the lead prosecutor, Felice Casson, said in an interview. "This case is contributing heavily to that."

Many of the Porto Marghera men who have died or are ailing started at the plant in the 1950s and '60s.

"These men were on the front lines of a war, only they didn't know it," said Fiamengo Bruna, whose 56-year-old husband, Ido Bettin, died of cancer 10 years ago. "It was a war without guns. They had no means of defending themselves."

Oliviero Saretta's children used to joke that he was "radioactive" when he came home from work.

"He had to wash himself and change his clothes at the plant," said Saretta's wife, Natalina Fassina. "In spite of that he still smelled of chemicals."

Saretta died of cancer, at 58, in 1987.

Nicola Palmieri, general counsel for Milan-based Montedison, said that the company's settlement with the workers and their families should not be construed as an admission of liability.

"These people have suffered," Palmieri said. "We do not believe we should drag them through extended litigation, through the very unpleasant rituals of testimony."

Federico Stella, an attorney representing Enichem's parent, Rome-based ENI, declined comment.

Fabbri views the 63 billion-lira settlement as nothing more than a shrewd public-relations move.

"They want to cut out the biggest part of the plaintiffs to reduce attention on the trial," he said.

Montedison, in particular, had good reason to want a lower profile. The company - which operated the Porto Marghera plant from 1966 to 1987 (although ENI acquired the property in 1983) - had ample evidence of *vinyl chloride*'s hazards.

In the early 1970s, it was one of four sponsors of animal research in Italy that demonstrated carcinogenic effects at low levels of exposure.

At the same time, documents show, Montedison and other European manufacturers formed an alliance with American companies such as Dow Chemical and Union Carbide, trading health information about *vinyl chloride* and at one point signing a

secrecy agreement forbidding the disclosure of research findings.

"The Americans should fear this case," Casson said. "If this (legal theory of manslaughter) should be exported, it could be very dangerous for them. All of them were involved in keeping the worker exposure limits as high as possible."

The prosecution was motivated by two main sources: Greenpeace, which has campaigned internationally against the family of chemicals known as chlorinated hydrocarbons, and Gabriele Bortolozzo, a former Montedison and Enichem worker killed in a cycling accident in 1995.

Bortolozzo had begun reading about *vinyl chloride* in the 1970s. By the 1980s, many of his contemporaries at the plant had died or were dying of cancer; he started collecting death certificates and talking to widows. In 1985, he was isolated by Montedison in a dusty warehouse - punishment, he believed, for his obstinacy.

Bortolozzo retired in 1990 but continued his quest. In 1994, he captivated Casson with an elaborate tale of corporate indifference. For this Bortolozzo was ridiculed by the trade unions, with which he already had a strained relationship, and others who saw him as a threat to the Porto Marghera economy.

Casson spent the next three years collecting internal documents and combing the files of some 7,000 workers. In 1997, he charged the former Montedison and Enichem executives with precipitating human and environmental disasters, disdaining studies and warnings about conditions in the plant.

The indictment issued by the "Tribunale di Venezia" specifically mentions the Italian animal-research program in the early 1970s, as well as a plant audit conducted by the University of Padua in 1975 and 1976. The audit detailed a "grave sanitary situation."

The upshot of the pervasive management neglect became apparent last year, when Italy's National Institute of Health reported that it had found statistically significant excesses of a number of cancers - including liver, brain and lung - in a mortality study of people who had worked at the plant between 1956 and 1995.

Bortolozzo would not have been surprised at the institute's revelations; he had written of a cancer epidemic years before.

"The real mortality from (*vinyl chloride*) is different from the 'official' one," he asserted in a report published by an Italian magazine, "Medicina Democratica," in 1994. "The data on deaths from angiosarcoma (an obscure cancer of the liver tied to *vinyl chloride* exposure) given by public bodies and companies are not reliable. Among those dead at Montedison because of *vinyl chloride*, only three have been officially recognized."

He continued: "Montedison has always had a state-of-the-art medical infrastructure, but with only one purpose: maintain the physical efficiency of the workers for production reasons. The message of the company was, 'Look, there's nothing bad, really.' As a matter of fact, they keep (people) working in the same place. This is

fascism."

Bortolozzo's daughter, Beatrice, and son, Gianluca, are among the few plaintiffs who refused to settle with the chemical companies.

"We would never accept their money," Beatrice said. "This factory has stolen husbands, stolen fathers. You can't put a value on the life of a person."

Two Montedison retirees in their 60s, neither of whom wished to be quoted by name, said in an interview that they blame the company for the demise of most of their friends and their own poor health.

Each has been plagued by sexual dysfunction, liver abnormalities and a numbing of the extremities, which becomes more pronounced in cold weather. Cancer is always in the back of their minds.

Although it was clear by 1974 that *vinyl chloride* was carcinogenic, the men said, there was no monitoring in the plant, which made both *vinyl chloride* monomer and polyvinyl *chloride* resin, until the early 1980s.

"We tried not to think about it," one said. "We had to work, and we had three choices: Leave Italy, go to the factory or do outlaw activities."

He added, however, that he would not allow his son to work for Montedison.

"I would have killed him myself before I would have let him do that."

For many years, the retirees said, *vinyl chloride* levels inside the plant were staggering, reaching a potentially explosive 40,000 parts per million near the reactors, where the liquid monomer was turned into resin.

There is no reason to believe that conditions were much better in U.S. plants prior to 1974, when the government imposed strict new limits on *vinyl chloride*.

As late as 1973, for example, an average of one employee per quarter was overcome by *vinyl chloride* vapor at a Conoco PVC plant in Aberdeen, Miss., according to a company document. This would indicate levels in excess of 15,000 ppm.

Both American and European manufacturers had access to data generated by an Italian oncologist, Dr. Cesare Maltoni, who in July 1971 began a series of animal experiments on *vinyl chloride* that lasted a decade.

The research was sponsored by Montedison and three other chemical companies, Imperial Chemical Industries of England, Solvay of Belgium and Rhone-Progil of France.

Maltoni knew by the fall of 1972 that *vinyl chloride* could produce tumors in rats - notably, angiosarcoma - at levels as low as 250 ppm.

There was disagreement, however, about whether this finding was conveyed to the U.S. government.

The Chemical Manufacturers Association and its British counterpart, the Chemical Industries Association, said that the information was passed on to the National Institute for Occupational Safety and Health by manufacturers at a meeting on July 17, 1973 - six months before three angiosarcoma deaths were reported by the B.F. Goodrich Chemical Co. in Louisville, Ky.

NIOSH said it wasn't told. The agency's surveillance director, William Lloyd, became so enraged at the suggestion that NIOSH had sat on the Maltoni data that he went on British television and called the industry officials "damned liars."

In fact, the American companies had agreed in 1972 not to divulge any of Maltoni's findings without the Europeans' permission.

Documents show that two of Montedison's top medical officials in the 1970s, Emilio Bartalini (a defendant in the trial) and Tiziano Garlanda, provided confidential information to members of the CMA's *vinyl chloride* panel before the chemical was openly acknowledged to be a carcinogen.

Dr. Theodore Torkelson, a retired Dow toxicologist who was on the panel at the time, said that the secrecy pact has been misinterpreted. Its intent, he said, was merely to prevent the premature release of data.

"They didn't want somebody going off half-cocked," Torkelson said of the Europeans.

The agreement held until Goodrich revealed the Louisville angiosarcoma deaths in January 1974. In the months afterward, many wondered why Maltoni's research hadn't been taken more seriously.

Now 68, Maltoni explored this still-sensitive subject during an interview at his laboratory, incorporated into a 15th-century castle near Bologna.

In the early years, he said, he was virtually alone in his contention that *vinyl chloride* should be tightly controlled in the workplace.

"The relevance of my work was not perceived," Maltoni said. "At that time, the philosophy was, 'Who cares about animal data? We want human data.' They were ready to attack me."

Louisville, he said, demonstrated that "animals may be highly predictive of an effect in humans."

And yet many industries and government bodies still require after-the-fact human evidence - decades-long epidemiological studies of dead workers - before they feel compelled to act.

"This is a tragedy," Maltoni said.

Montedison's failure to respond to what was universally described as solid research by Maltoni is one of the chief issues in the Venice trial.

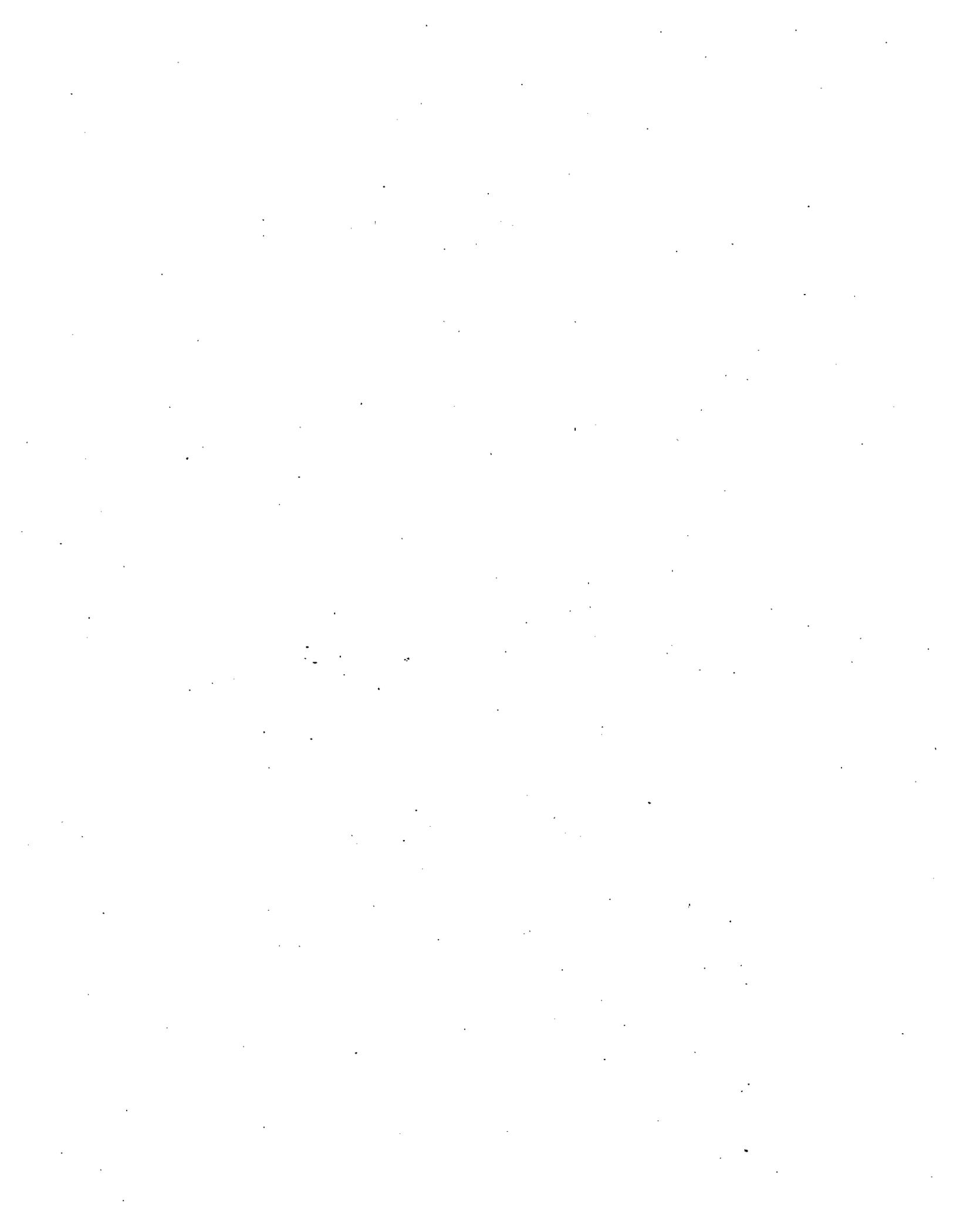
"They knew for sure," prosecutor Casson said of the company. "They commissioned the work."

Said Montedison counsel Palmieri: "We knew that the product had some effect on health. We don't know exactly what happened (at Porto Marghera), whether there is causation. These workers may have contracted their illnesses in the workplace. Probably not." ... 1972-74 ...international tension In 1972, Dr. Cesare Maltoni, an Italian oncologist, confirmed a strong link between exposure to *vinyl chloride* and angiosarcoma, a rare liver cancer, in lab animals. Before sharing the research results with the American chemical industry, the European sponsors required a formal agreement of confidentiality. we pledge to hold such information strictly in confidence within our company unless and until formally notified specific consent to its release has been granted by the European sponsors. ... March 23, 1973: An Allied Signal internal memo describes Dow Chemical's concerns about Maltoni's research and the desire to present a united front in providing the information to the National Institute for Occupational Safety and Health (NIOSH). Dow Management is extremely worried about this development and one of their executives is about to contact other producers (and presumably users) so that the industry (with permission of the European group) can as a group take all the data known to NIOSH. They do not want to act unilaterally. ... In early 1974, the cancer connection became public when B.F. Goodrich reported angiosarcoma cases among workers at its PVC plant in Louisville, Ky. This led to renewed interest in the European animal research, and a public statement by Britain's Chemical Industries Association that NIOSH had been told about the research the previous year. William Lloyd, a top NIOSH official, angrily denied the claim and discussed it in a July 19 letter to A.W. Barnes, a chemical industry executive in England. As regards the controversy as to who knew what about angiosarcoma of the liver associated with VC exposures, I have personally concerned myself with tracking down the rumors which began circulating the week of January 22, 1974, that NIOSH had previous knowledge of the problem. And, after thorough review of the facts which convinced me that there was no substance to these rumors, I strongly urged our Director to publicly state that there was no support for such stories. ... In his response, Barnes conceded that angiosarcoma was not discussed at a 1973 meeting attended by NIOSH representatives, but implied that NIOSH should have been more inquisitive. With hindsight it is the greatest of pities that we didn't happen to mention the liver in the initial presentation or, not having done so, that we weren't asked which sites were affected. ... 1973 ... moral and legal issues March 26, 1973: A letter to chemical executives from the Manufacturing Chemists Association, a trade group, discusses ethical and practical aspects of informing government agencies about *vinyl chloride* health research. There is also the aspect of moral obligation not to withhold from the Government significant information having occupational and environmental relevance, and the desirability of industry taking the initiative rather than at some later time having to defend another course. ... May 31, 1973: A Union Carbide internal memo raises a legal concern about the March 26 MCA letter: 1. The MCA letter to company executive contacts, dated March 26, 1973, could be construed as evidence of an illegal conspiracy by industry if the information were not

made public or at least made available to the government.

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GRIM NUMBERS/ The astonishing amount of *vinyl chloride* present at a plant in England

By JIM MORRIS
Staff

CHESTERFIELD, England - When he worked at the Vinatex PVC plant in the early 1970s, Colin Hadfield often marveled at his good fortune.

"It was the best job I ever had, the easiest job I ever had," Hadfield said. "I kept asking, 'Is there any danger?'"

Assured by management that there wasn't, Hadfield put in 4 1/2 years at the plant, a joint venture of Conoco and a now-defunct British company, Stavely Chemicals Ltd.

Only later did he realize the downside of one of the most coveted blue-collar jobs in the North Midlands. He developed acroosteolysis, which caused his fingers to whiten and go numb. He became impotent, had pounding headaches, was constantly tired.

In a sense, Hadfield is lucky. He doesn't have cancer - as far as he knows - and has made it to age 63.

Dozens of other former Vinatex workers, who inhaled *vinyl chloride* at levels far exceeding even the most lenient standards of the time, are dead or dying.

"These people have got away with industrial murder," said David Foster, a haggard man of 55 who suffers from a liver ailment that may be a precursor to cancer.

"They've known about this bloody stuff for a long time. They fooled people into believing it was bloody harmless."

John Knight, coordinator of the North Derbyshire Trade Union Safety Committee, estimates that only about half of the 250 people who worked at Vinatex during its 15-year history are still alive.

He and several associates have begun tracking down and interviewing the surviving

Vinatex workers, and the families of those who died.

"We're going to look into a range of things: government benefits, compensation awards, litigation," Knight said. "We're also going to look into publicizing it worldwide, because workers in other areas who've dealt with *vinyl chloride* have all been told the same story: that the chemical is perfectly safe, that you can taste it, you can touch it, you can smell it."

Vinatex opened here in the industrial north of England in 1969. After word circulated about the generous pay and relatively soft work, the new plant was deluged with applicants.

Business was good. By 1970 Vinatex was running 40 reactors, turning *vinyl chloride* monomer into PVC resin.

It took only a few years for the first cases of acroosteolysis - "white-finger," the workers called it - to appear. Much later came the cases of angiosarcoma, the liver cancer caused almost exclusively by exposure to *vinyl chloride*.

The chemical was present in astonishing amounts at Vinatex. One measurement in 1973 showed an airborne concentration of 50,000 parts per million - 100 to 1,000 times what most manufacturers then considered to be the safe limit.

"Anytime anybody had any suspicions or qualms, they were soon dispelled by management," said Foster, who drove a tanker truck for Vinatex. "People were afraid to speak out."

Geoffrey Larkin, 61, used to climb into the reactors to clean them. The vapors were so intoxicating, he said, that "you'd feel as though you'd just came out of the pub."

Larkin has since had two heart attacks, pneumonia and an enlarged spleen, which had to be removed.

By the early 1980s, Vinatex had settled more than 35 claims for compensation by acroosteolysis victims, and by 1984 it was out of business.

The deaths and illnesses did not stop, however, and questions are being raised about Houston-based Conoco's role in the debacle.

"Conoco took over the plant soon after it opened," Knight said. "They had some chaps come over from the United States and train people in production methods."

Said Hadfield, a former plant operator: "The idea was that they were making the same stuff in America, but they came here because it was more accessible to Europe."

Although Conoco had a 50 percent interest in Vinatex for its first 10 years, "we did not have any role in the day-to-day operation of the facility," spokesman Carlton Adams said. "We did share some information with them on some of the early (*vinyl*

chloride) studies."

On June 20, 1973, D.M. Jonas of Vinatex wrote to Conoco's Research and Development Department, then in Ponca City, Okla., seeking details of two studies sponsored by a group of American manufacturers.

Conoco's Flynt Kennedy responded on Aug. 30 that the studies were still in their early stages.

"There are no hard data to support specific health and safety problems related to VCM (*vinyl chloride* monomer) at this time," Kennedy wrote. But he added, "I would agree that Vinatex should take appropriate steps so that worker exposure to VCM vapors is at the lowest practical value."

A few months earlier, Imperial Chemical Industries, the British conglomerate that supplied *vinyl chloride* monomer to Vinatex, had issued a misleading position paper stating that the compound caused cancer in rats at 30,000 parts per million, and that this was "greatly in excess of the levels to which workers in the industry are normally exposed."

In his letter, Kennedy called the Imperial paper "an excellent, concise summary of the problem regarding not only past information, but also the current situation."

He did not mention that Italian animal studies - well known to both American and European manufacturers by late 1972 - had found *vinyl chloride* to be carcinogenic at levels as low as 250 ppm.

According to the former Vinatex workers, Conoco was an active partner in the operation. Attorneys for the workers' union, however, saw no tactical value in pursuing the American firm in court.

"They got off very, very, very lightly," Foster said.

Already weakened by his liver condition, Foster has been told by his doctors that he may develop angiosarcoma, a particularly aggressive and painful cancer.

"It's a specter hanging over all our lives," he said. "We don't know when it's going to hit us."

Last year the disease claimed 55-year-old Graham Houghton, a former Vinatex truck driver. Former operator Barry Caudwell was diagnosed in February 1993 and was dead, at 59, by the following January.

"He was in terrible pain those last 11 months, terrible," said Caudwell's wife, Joan. "He couldn't walk very far, and his lung collapsed."

Cancers other than angiosarcoma also materialized.

Andrew Giove watched his once-strapping father, Marco, who cleaned reactors at

Vinatex, wither and die from a brain tumor last year at 65.

"They just get away with it," Giove said of the chemical companies. "They shouldn't be able to. They ruined a lot of people's lives."

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in strictest confidence / The chemical industry's secrets / TOXIC SECRECY / For years, makers and users of *vinyl chloride* concealed the terrible truth: The chemical can cause cancer

By JIM MORRIS

Staff, Copyright 1998, Houston Chronicle

LAKE CHARLES, La. - Blind and comatose, Dan Ross succumbed to brain cancer on Oct. 9, 1990.

A large and unpretentious man of 46, Ross had spent 23 years at the Conoco - later Vista - chemical plant here. He had made a good living, raised a family, saved for retirement.

After his diagnosis, Ross came to believe that he had struck a terrible bargain, forfeiting perhaps 30 years of his life through his willingness to work with *vinyl chloride* and other cancer-causing substances.

"Just before he died, he said, 'Mama, they killed me,' " recalled his wife, Elaine. "I promised him I would never let Vista or the chemical industry forget who he was."

She hasn't. Her husband's untimely death set her and a local attorney, William Baggett Jr., on a circuitous course of litigation that led to the industry's well-insulated core.

During the past eight years, Baggett has acquired thousands of previously secret documents, most having to do with *vinyl chloride* - used to make one of the world's most common plastics.

These documents, and others obtained in recent months by the Houston Chronicle, suggest that major chemical manufacturers closed ranks in the late 1950s to contain and counteract evidence of *vinyl chloride*'s toxic effects.

Letters, memoranda and minutes of meetings depict a framework of dubious science

and painstaking public relations, coordinated by the industry's main trade association.

There are two dominant themes: Avoid disclosure and deny liability.

"There was a concerted effort to hide this material," said Dr. David Rosner, a professor of public health and history at Columbia University who has reviewed many of the documents as part of a research project. "It's clear there was chicanery."

In a prepared statement, the Chemical Manufacturers Association called such charges "irresponsible." The group said that it promotes a policy of openness among its members.

"We took the problem seriously," said Dr. Theodore Torkelson, a retired Dow Chemical toxicologist who chaired the CMA's *vinyl chloride* panel for 11 years in the 1970s and '80s. "We did what we thought was ethical, scientifically sound and morally responsible."

The documents present another scenario: That the chemical companies, through their silence and inertia, subjected at least two generations of workers to excessive levels of a potent carcinogen that targets the liver, brain, lungs and blood-forming organs.

Although they freely shared health information among themselves, the companies were evasive with their own employees and the government. They were unwilling to disrupt the growing market for polyvinyl *chloride* (PVC) plastic, used in everything from pipe to garden hoses.

"Even though they may be competitive in some spheres, in others they aren't," Baggett said. "They have a mutual interest in their own employees not knowing (about health effects), in their customers not knowing, in the government not knowing."

Put in context by hundreds of interviews, the documents flesh out a story that made headlines during the first half of 1974, only to be overshadowed by Watergate and Richard Nixon's resignation.

And they accentuate the problem of occupational cancer, which, by some estimates, takes more lives (50,000) each year than AIDS, homicide or suicide, but receives far less attention.

To this day, most manufacturers acknowledge only that *vinyl chloride* causes angiosarcoma, an extremely rare cancer of the liver. They insist that the exposure levels necessary to produce the disease have not been seen in two decades.

As a rule, this is true. Because of government-required controls - controls the industry resisted - *vinyl chloride* contamination in and around chemical plants has been reduced dramatically.

Significant exposures in some places occurred well into the 1980s, however. And unusual cancers other than angiosarcoma continue to kill chemical workers and

retirees prematurely.

On April 30, Henry Tousaint, who had spent 20 years at the PPG Industries plant in Lake Charles, died of mantle-cell lymphoma at age 54.

Tousaint and other PPG workers routinely cleaned chemical storage tanks and mixed pesticides, inhaling *vinyl chloride*, benzene and other carcinogens in the process. Those who complained of dizziness or breathing difficulties were given cough syrup, kept in gallon jugs, Tousaint said three months before his death.

"We didn't know no better," he said. "But they did."

Officials at the company's Pittsburgh headquarters would not comment.

Baggett won large settlements for both the Tousaint and the Ross families from PPG, Conoco and Vista, none of which admitted culpability. He is building a conspiracy case against 29 other chemical companies, the CMA and the Society of the Plastics Industry, alleging that they obfuscated evidence of *vinyl chloride*-related deaths and diseases.

"What I hope to achieve, through Billy, is that every man who works in a chemical plant is told the truth and tested on a regular basis in the proper manner," Elaine Ross said. "I want the chemical companies to be accountable for every little detail that they don't tell these men."

Since the death of her husband - a towering, blond man she met in Alabama when she was 17 and he was 20 - Ross has oscillated between despair, rage and listlessness. She gave up sewing, baking and other diversions. She can't sleep without tranquilizers, can't bear to look at Dan's picture.

She sees older couples and is filled with resentment, thinking: "That should have been us."

By the spring of 1959, the evidence was beginning to accrue.

Manufacturers of *vinyl chloride* - then known only as an explosion hazard and an intoxicant - came to realize that the compound might be poisoning the people who worked with it.

Dow had been discreetly testing the sweet-smelling, gaseous substance on rats, rabbits, guinea pigs and dogs at its Biochemical Research Laboratory in Midland, Mich.

The results were troubling. Adverse liver effects had been seen in animals that had inhaled only 100 parts per million of *vinyl chloride*, a fraction of the concentration to which many workers were exposed.

In a letter to the B.F. Goodrich Chemical Co.'s industrial hygiene director on May 12, 1959, one of the Dow scientists, V.K. Rowe, outlined the experimental findings

and concluded that *vinyl chloride* could produce "rather appreciable injury" among workers routinely exposed to 500 parts per million, then the voluntary standard. Rowe ended his letter with a plea:

" . . . this opinion is not ready for dissemination yet and I would appreciate it if you would hold it in confidence . . . "

For the next 15 years, the Goodrich hygienist and many others responsible for worker health in the chemical industry did a remarkable job of honoring such requests.

Before Dow began its animal work in 1958, there had been few investigations of *vinyl chloride* - although acute effects had been seen in guinea pigs as early as 1930, and liver damage had been found in 15 of 45 *vinyl chloride* workers examined as part of a 1949 study in the Soviet Union.

The Dow researchers published their data in the American Industrial Hygiene Association Journal in 1961, recommending a *vinyl chloride* exposure limit of 50 ppm.

No one outside of Dow listened. Indeed, a 1963 Yale University animal study sponsored by Allied Chemical found no significant effects below 500 ppm.

"The industry goofed up," said Torkelson, who helped conduct the Dow experiments. "Probably if they had listened to our 50 ppm (recommendation), we wouldn't have had a problem."

(The Occupational Safety and Health Administration didn't come into being until 1970; consequently, there was no government agency to force companies to act.)

In the fall of 1964, Goodrich - which would be commended for revealing a cluster of angiosarcomas at one of its plants a decade later - sought help from the Kettering Laboratory at the University of Cincinnati.

A puzzling hand disability had emerged among workers who cleaned the reactors - huge, blenderlike devices in which *vinyl chloride* monomer is turned into PVC resin - at a Goodrich plant in Louisville, Ky.

At the time, cleaners entered the reactors without respiratory protection to chip away the residue that built up on the walls.

"Nobody felt like *vinyl chloride* was a problem," said Jerome Heckman, a Washington attorney who has represented the Society of the Plastics Industry for 44 years. "The workers used to climb down in those damned reactors and play around in them because they got a great high out of it."

By 1966, it had become apparent that the hand condition - acroosteolysis, characterized by numbness and swelling of the fingers - was systemic, indicative of *vinyl chloride*'s toxicity. And it was not confined to reactor cleaners.

The following year, an epidemiological study of *vinyl* workers commenced at the University of Michigan. All company data, it was emphasized, would be held "in strictest confidence."

As the Michigan researchers catalogued cases of acroosteolysis, Dr. Pier Luigi Viola, an industrial physician for the Belgian chemical firm Solvay, attempted to produce the disease in monkeys and rats exposed to *vinyl chloride* gas in a Rome laboratory.

Instead, he produced cancer, albeit at high concentrations. American manufacturers grasped the significance of this unexpected finding.

"Since this report appears to be so convincing," Dr. George Roush, medical director of the Ethyl Corp. in New Orleans, wrote to a colleague on June 24, 1970, "I suppose that we must consider *vinyl chloride* as a carcinogen . . ."

By the end of 1972, Dr. Cesare Maltoni, an Italian oncologist, had seen angiosarcoma in rats exposed to as little as 250 ppm of *vinyl chloride*. The news traveled quickly across the Atlantic.

An Allied Chemical memorandum called Maltoni's results "disconcerting," and a Uniroyal memo concluded, "The work in Europe indicates we have a problem which cannot be ignored."

Although the Michigan acroosteolysis registry ultimately collapsed from lack of industry cooperation, its keepers managed to convey an important message to the Manufacturing Chemists Association, the trade group that later became the CMA: Get people out of the reactors, or at least limit exposures to 50 ppm.

The recommendation, included in a confidential report to the MCA in February 1969, was not followed. As a result, workers such as William Smith were needlessly exposed to high levels of *vinyl chloride*.

Smith entered his first reactor at the Goodyear Tire and Rubber Co. plant in Niagara Falls, N.Y., in November 1973.

He died, at 40, of a brain tumor on Sept. 15, 1993, leaving behind a wife and young daughter. He was hospitalized for the last eight months of his life, unable to speak.

"Every day I went to the hospital, and we would write on a pad," said his wife, Holly Cummings. "It took him half an hour or 45 minutes to get one stupid sentence down. It eventually got to the point where he couldn't even nod his head."

Cummings settled a lawsuit against Goodyear, but not before company lawyers tried to blame her husband's cancer on nitrates in lunch meat. "They asked me how much bologna he ate," Cummings said.

The wall of secrecy surrounding *vinyl chloride* was not breached until Jan. 23, 1974, when B.F. Goodrich announced that it had found three fatal cases of angiosarcoma among workers at its PVC plant in Louisville.

Although Goodrich was praised for its candor, it and other manufacturers knew a great deal about the chemical's toxic properties long before Louisville and understood the economic consequences of bad publicity.

Indeed, Goodrich - fearful of a broad indictment of PVC - had tried to stop publication of a European researcher's paper in 1966, according to a Monsanto memo. It is unclear whether Goodrich succeeded.

Goodrich said in a prepared statement that it "has always acted responsibly in addressing potential health risks associated with direct exposure to *vinyl chloride*."

(An article on acroosteolysis, authored by four Goodrich medical officials, was published in the Journal of the American Medical Association in 1967. It was inconclusive, suggesting that the disease was not serious or common, was restricted to reactor cleaners and was due in large part to "personal idiosyncrasy.")

The Louisville cancer revelation in 1974 set in motion months of frenetic activity in Washington, highlighted by contentious OSHA and congressional hearings. Labor leaders and public-health advocates spoke of a cover-up by the *vinyl* industry; the industry accused them of overreacting and threatening its very survival.

OSHA adopted an emergency temporary standard of 50 ppm and later proposed a permanent standard of 1 ppm. A federal ban was imposed on the use of *vinyl chloride* as a propellant in hair sprays, pesticides and other aerosol products; a proposed ban on PVC liquor bottles was averted when the industry found a way to limit migration of *vinyl chloride* into the liquor.

(Mindful of "essentially unlimited liability to the entire U.S. population," as Union Carbide put it in 1973, some manufacturers already had begun to pull out of the aerosol market. Tests had shown that it was not unusual for hair spray users of that era to be exposed to hundreds or even thousands of parts per million of *vinyl chloride*; a 1972 Carbide memo pointed out that "beauty operators applying hair spray on a daily, routine basis might actually be a better population to examine than chemical plant operators.")

Despite the convincing animal data from Italy and public pressure, the chemical companies did not acquiesce. A study commissioned by the Society of the Plastics Industry concluded that the new OSHA standard would eliminate at least 1.6 million jobs - from reactor cleaners to plastics fabricators - and have a minimum economic impact of \$65 billion.

The SPI challenged the standard before a three-judge federal panel and lost on Jan. 31, 1975.

"I argued that it was arbitrary and capricious to say 1 (ppm), that they pulled that number out of their ear," said Heckman, the society's attorney. "I got killed in court."

In the panel's opinion, retired Supreme Court Justice Tom Clark wrote that "the

record shows what can only be described as a course of continued procrastination on the part of the industry to protect the lives of its employees."

Despite the dire predictions, the industry did not disappear.

Using technology developed in Japan in the late 1960s, manufacturers installed reactors that greatly reduced the need for manual cleaning. New ways were found to lower the *vinyl chloride* content of PVC resin from hundreds of parts per million to less than 1 ppm.

"The industry really, really changed," said Bill Carroll, a vice president with Occidental Chemical in Dallas and an officer with the *Vinyl* Institute, a trade association. "If you look at how close it might have come to being regulated out of existence - to come from that circumstance to the point of doing what had to be done to make the product safe, I think it's a tremendous success story."

There remained, however, the matter of cancer.

By the mid-1970s, clusters of disease were beginning to spring from plants such as the Monsanto chemical complex in Indian Orchard, Mass. For *vinyl* workers who had started in the 1940s, '50s and possibly the early '60s, the requisite latency for cancer had passed.

In the summer of 1975, a group of Monsanto workers approached the Massachusetts Department of Labor and Industries with the death certificates of 56 former colleagues and a list of others who had died.

A department physician found additional deaths and determined that there was a cancer excess among workers who had been assigned to Building 85, where PVC resin was fabricated into *vinyl* swimming-pool bottoms, wallpaper backing and other items. Pancreatic cancer had killed at a rate five times the national average.

The National Institute for Occupational Safety and Health did a study, as did Monsanto. Their conclusions were strikingly different.

Monsanto found "no occupationally related health problem" at the plant. NIOSH found an excess of digestive-system cancers and said it suspected "occupational factors."

Workers, understandably, were frustrated and confused. Erik Wengstrom, who was laid off in 1973 and spent years documenting cancer cases in hopes of holding Monsanto liable, remains bitter about the experience.

"People were dying like flies," Wengstrom said.

In February 1979, the *vinyl* industry was presented with another potential crisis. OSHA had found a cluster of brain cancers at the Union Carbide plant in Texas City, and *vinyl chloride* was strongly suspected as the causative agent.

As was the case at Indian Orchard, concurrent studies yielded conflicting results. NIOSH and Union Carbide could not even agree on the number of brain cancer deaths; the former listed 23, the latter 12.

Even the Carbide number represented an excess. But the company attributed it to chance, not chemicals.

In a study published in 1982, federal investigators gave details of 25 brain cancer deaths among former employees of Dow's Texas Division in Freeport. The deaths occurred between 1951 and 1977, and most the cancers were of two strains: astrocytoma and glioblastoma.

The average age at death was 55, and eight of the victims were under 50. The conclusion - with which the company strenuously disagreed - was that there was "an increased risk of death due to brain tumor" among ex-Dow workers.

In the late 1980s and early '90s, cancer became an issue for Houston-based Vista, now known as Condea Vista. At least four workers - Dan Ross and another man at Vista's *vinyl chloride* monomer plant in Lake Charles, and two men at its PVC plant in Aberdeen, Miss. - had developed brain tumors, and there had been other cancers as well.

Vista management held several meetings with workers in an effort to quell fear and mistrust. These were some of the comments received during two sessions in Lake Charles in April 1991, according to a Vista memo:

"Previous explanation about cancer deaths was a snow job, bull----. Our questions were not answered. We believe these employees died because of exposure in the plant. We were told to shut up and not make trouble."

"We think our jobs are killing us. No one listens."

"If the real answer is that Vista doesn't know how much we're hurt by this exposure, then we deserve some kind of compensation for the agony of not knowing."

"EDC (ethylene dichloride, a suspected carcinogen) drips from the ceiling. When you flush the toilets in the plant and the water fills up again you're overcome with EDC fumes."

Ray Reynolds, Vista chairman of Oil, Chemical and Atomic Workers Local 4-555 and an operator at the Lake Charles plant, said in an interview that the company has been slow to respond to such concerns, despite evidence that chemical exposures have caused illness and death.

"It's all about money," said Reynolds, a gaunt man of 41 with a baffling - and, he thinks, work-related - condition of the nervous system that keeps him fatigued and in pain. "All these years, I believe, they've been killing people, but they've put a dollar figure on it."

Tom Grumbles, Vista's manager of product safety and occupational health in Houston, said that the 1991 meetings were tense but productive, part of a "fairly extensive effort to communicate with our employees.

"Obviously, personal medical issues are very emotional for people," Grumbles said. "There's little chance you're going to satisfy everyone."

Predictably, some of the cancers out of the chemical plants gave rise to workers' compensation claims and lawsuits.

Few of these actions, however, resulted in lucrative judgments or settlements; the burden of proof for occupational cancer was simply too great, and the industry was able and willing to play hardball.

After her husband, Joseph, died of angiosarcoma in January 1989, Dorothy Succi filed a claim against his employer, Gencorp Polymer Products, which operated a PVC plant in Ashtabula, Ohio.

Succi had spent 28 years at the plant (closed in 1983) as a laborer, a mechanic and an electrician. He was diagnosed with angiosarcoma - irrefutably tied to *vinyl chloride* exposure - in 1988, and was included in a worldwide, industry-maintained registry.

When his widow sought death benefits from the Ohio Bureau of Workers' Compensation, however, Gencorp fought her, saying "we do not believe (Succi's) condition is the result of his employment with us."

A hearing was held in Columbus in November 1989, and Dorothy Succi won. But Gencorp appealed.

In a Jan. 9, 1990, letter to Succi's attorney, Gencorp safety and workers' compensation manager Kenneth Breyley offered \$37,500 to settle the case.

"I truly believe we can convince the Industrial Commission the angiosarcoma could not have been the result of Joseph's exposures to 'chemicals' at the workplace," Breyley wrote.

In an interview, Succi said that she settled for \$48,000 after being warned by her lawyer that the case could go on for years. "I just wanted a closing to it," she said.

Gencorp spokeswoman Rosemary Younts said that the claim was contested because Joseph Succi spent most of his career as an electrician and would have had minimal contact with *vinyl chloride*. A document from the angiosarcoma registry, however, indicated that Succi had high exposures during his first few years at the plant.

Lake Charles attorney Baggett maintains that the 5,000 or so workers in U.S. *vinyl chloride*, ethylene dichloride and PVC resin plants aren't the only ones vulnerable to cancer and other serious ailments.

An estimated 120,000 people work in PVC fabrication, turning the white powder

into flooring, siding, blood bags and other familiar products. Might they, too, be at risk?

"No one (in industry) is going to study fabricators," Baggett said. "It'll never happen. What if they found something?"

Quite by accident, a Swedish researcher did find something. Three years ago, Dr. Lennart Hardell, an associate professor of oncology and epidemiology at Orebro Medical Center, began distributing questionnaires to testicular cancer victims and a group of controls.

Hardell was searching for possible occupational causes of the disease, on the rise in Sweden and other industrialized countries. By the time he had compiled his data, only one line of work stood out: PVC fabrication.

"We hadn't expected anything on PVC," Hardell said in an interview. "We had no suspicions."

The study was published late last year. Considering the high risk he had observed for PVC exposure, Hardell called for further investigation.

The Brussels-based PVC Information Council responded swiftly and decisively, as its American counterparts had done many times before.

"We do not see a cancer threat for (PVC) workers," the council said.

Coming Monday

It's a crime

The husband of Natalina Fassina, right, and more than 150 other former employees of a *vinyl* plant near Venice have died of cancer since 1973. Italian prosecutors say that's a crime. Now 31 former chemical company executives are standing trial on manslaughter charges alleging they exposed plant employees to excessive amounts of *vinyl chloride* despite warnings of its danger.

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HOUSTON CHRONICLE ARCHIVES



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in strictest confidence / SECOND OPINION / In an 'extremely unusual' event, a doctor under industry contract reversed his damaging conclusions in a study of worker deaths involving *vinyl chloride*

By JIM MORRIS

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IN SEPTEMBER 1991, the American Journal of Industrial Medicine published what appeared to be yet another prosaic study linking *vinyl chloride* to cancer, another scrap of evidence in a seemingly endless inquiry.

The lead author was Dr. Otto Wong, a prominent California epidemiologist. Five years earlier, Wong and three associates had finished updating a study of worker deaths in the *vinyl* industry and had found significant excesses of liver and brain cancer, as well as emphysema.

Their findings were reported in the journal article and might have stirred only mild interest but for one thing:

Wong hadn't received permission from the study's sponsor, the Chemical Manufacturers Association, to publish his data - data that could be used against the industry in lawsuits, that might alarm workers and attract regulators.

The unauthorized publication provoked members of the CMA's *vinyl chloride* panel and touched off a months-long effort to persuade Wong to recant, documents show.

Although Wong denies that he was pressured, he changed his story on *vinyl chloride*, declaring that the apparent excess of brain cancer deaths among workers might well be the result of "diagnostic bias" - better reporting and diagnosis of the disease in industry than in the general population.

Letters propounding this theory from Wong and one of his co-authors - as well as Dr. Hasmukh Shah, then manager of the CMA panel - appeared in the August 1993 issue of the Journal of Industrial Medicine.

"This is extremely unusual," said Dr. Philip Landrigan, the journal's editor and chairman of the Department of Community and Preventive Medicine at Mount. Sinai Medical Center in New York. "I've never seen a retraction of epidemiological findings like this with almost no defense (by the authors)."

Reprints of the Wong and Shah letters were distributed among the chemical companies and their attorneys. They are still cited by defendants in brain cancer cases, and are used to reassure workers about the safety of *vinyl chloride* and polyvinyl *chloride*. Frequent defense witness

Although he describes himself as an independent scientist, Wong has had a long relationship with trade groups like the CMA and the American Petroleum Institute, and frequently testifies as a defense witness.

Some believe that Wong's reversal on *vinyl chloride* was simply another episode in a decades-long history of unreliable, industry-sponsored research.

"The ultimate lesson is that you can't trust industry and its usual contractors to do this kind of work," said Herschel Hobson, an attorney in Beaumont who represents workers and has encountered Wong in several cases. "You must have some sort of independent oversight."

In a telephone interview, Wong, president of Applied Health Sciences of San Mateo, Calif., said that he wrote the "diagnostic bias" letter because he genuinely believed it could help explain the elevated brain cancer rate among *vinyl chloride* workers.

He had meant to raise the issue in the initial, 17-page article, he said, but "we didn't have the space to do it." He pointed out that he had stood by his 1991 finding on emphysema, although Shah had challenged it as well.

The CMA refused to make Shah available for an interview. Members of its *vinyl chloride* panel - representatives of manufacturers such as Dow Chemical - also declined interview requests.

In a prepared statement, the CMA said that the panel did not pressure Wong to retreat from his 1991 position.

"Our studies are conducted with world-class experts of the highest integrity . . . (who) have their results put in the public domain," the statement said. "The purpose of this research is to enable companies to take appropriate precautions to protect the health of workers and the environment." Study's shortcomings

Documents show, however, that the CMA's epidemiological study of *vinyl chloride* workers, which began in 1973 and is being updated a third time, had major shortcomings from the start.

Older, highly exposed workers were left out, as were entire plants. Younger workers with little or no exposure were included. Exposures were misclassified.

These defects were recognized and discussed by the CMA and participating companies, but were not corrected. Wong said that they were not brought to his attention.

The late Dr. Joseph Wagoner, an epidemiologist with the National Institute for Occupational Safety and Health and the Occupational Safety and Health Administration in the 1970s, was one of the first outsiders to spot what he called "latency bias" in the study.

He noted, for example, that the oldest *vinyl* plant in the country - Union Carbide in South Charleston, W. Va., which opened in 1938 - gave the CMA's contract researchers only records of workers who were still on the payroll or had left the company during the last six years of the 30-year study period.

"As a result," Wagoner wrote in a 1974 memo, "many of those persons with the longest latency were not included."

Lake Charles, La., attorney William Baggett Jr. put it more bluntly: "They stacked the deck."

The irony is that the researchers found an abundance of cancer despite the study's inherent weakness, said Baggett, who has represented plaintiffs in several lawsuits against *vinyl chloride* manufacturers.

"They underestimated how potent a carcinogen they were dealing with," he said. "An extremely young population, including many workers who had barely been exposed, still had a significant amount of disease."

Angiosarcoma - which virtually everyone agrees can be caused by *vinyl chloride* exposure - was not the only cancer in excess. By the mid-1970s, some company officials seemed resigned to this unpleasant reality.

"At present, the epidemiological work has amply demonstrated an association between high exposures to VCM (*vinyl chloride* monomer) and an increase in angiosarcoma of the liver, brain and lung tumors," Dr. Mitchell Zavon with the Ethyl Corp. wrote in an interoffice memo on June 18, 1976.

The news got worse. In 1981, an Italian research team led by Dr. Cesare Maltoni published 10 years' worth of animal data, concluding that *vinyl chloride* is a "multipotential carcinogen, affecting a variety of organs and tissues."

In 1987, the International Agency for Research on Cancer in Lyon, France, proclaimed that there was sufficient evidence to believe the chemical causes cancer of the liver, brain and lung, as well as leukemia and lymphoma.

And yet, when *vinyl* workers with cancers other than angiosarcoma - or their families - seek compensation, their claims almost invariably are contested. They are confronted with experts like Otto Wong.

At Baggett's request, Dr. Richard Lemen, a former NIOSH director and now a consultant in suburban Atlanta, has done an analysis of the CMA's 25-year *vinyl chloride* study, which in its later incarnations included 10,173 workers.

"This is probably the longest ongoing study I've ever seen," Lemen said. "*Vinyl chloride* is such an important product that, I think, industry hopes to show it's not that big a problem, that the post-1974 controls (imposed by OSHA) have been effective."

In fact, he said, "We don't know what's going to happen to people who entered these plants after the levels went down, because there's such a long latency period for cancer. It's going to take another 25 or 30 years to get that answer."

At about the time the epidemiological study was begun, the *vinyl* industry subsidized animal research at Industrial Bio-Test Laboratories in Illinois. An unfortunate choice

IBT proved to be an unfortunate choice: conditions in the cages were wretched, data were fabricated and concealed, and the labs were closed in 1978. Three former executives were convicted of defrauding the federal government and drug and pesticide manufacturers.

"When IBT went down, they took a lot of work into the toilet, including *vinyl chloride*," said Hobson, the Beaumont lawyer.

By the late 1980s, the chemical companies' political and public-relations worries about *vinyl chloride* had ebbed. Then they were blindsided by Wong.

In a letter to the director of the *Vinyl* Institute on Oct. 21, 1991, Dr. Robert K. Hinderer of B.F. Goodrich reported that he had just seen a copy of Wong's article in the *Journal of Industrial Medicine* and "quickly realized that this was the work that was sponsored by the CMA (*vinyl chloride*) Panel.

"Unfortunately, the authors failed to send a draft to the Panel for review prior to publication," Hinderer wrote. "When I discussed this with Dr. Shah at CMA, he indicated that CMA would notify them that they have violated their contract. The next step will be for the whole Panel to consider what corrective actions are necessary and / or appropriate. Hopefully, the authors will be agreeable to add some clarifying comments in a letter to the editor."

CMA memos indicate that Shah gave the matter his full attention and spent months trying to arrange a conference call between Wong and the panel members.

Wong said that he had discussions with them about the article, but that no one accused him of violating his contract. "If that's how they feel about it, that's too bad, because I insist on my right to publish," he said.

Wong's unusual self-critique in the journal was warmly received by the *vinyl* industry. Within days of its publication in 1993, Houston-based Condea Vista was using it to curb lingering worry and discontent among its workers.

In early 1995, the CMA contracted with Dr. Kenneth Mundt of Amherst, Mass., to update the study a third time; Wong had bid on the project and lost.

A Vista memo prepared in support of the update emphasized that manufacturers continued to face lawsuits alleging a connection between *vinyl chloride* and an assortment of cancers.

"This type of research is useful in defending such litigation," Vista said.

In an interview, Mundt said that he was never told of imperfections in the basic CMA data and had no reason to suspect any. He said that he expects to complete his update by October, and would not discuss his preliminary findings.

Mundt said that he saw nothing strange in Wong's about-face on brain cancer. Mundt doesn't believe, however, that the excess among *vinyl* workers is attributable to diagnostic bias.

"I don't think that that's a strong explanation for this," he said. "It's a possibility."

Mundt began a separate study for Vista in 1994, reviewing cancer deaths at the company's *vinyl chloride* plant in Lake Charles and its PVC plants in Oklahoma City and Aberdeen, Miss.

In his final report in 1996, Mundt explained that he had tracked 1,915 men who had worked at least a month at the three plants between 1963 and 1993, and had found elevations of brain, pancreatic and - for white workers only - lung cancer. None of the elevations was so striking that it pointed to a workplace problem, Mundt said.

In a brochure prepared for its employees, Vista conceded that a number of older workers were excluded from the study. It blamed Conoco, which owned the plants until 1984, for not turning over the workers' records, although Conoco says that it only failed to supply Social Security numbers for 75 people from Oklahoma City.

According to Vista, only one fatal brain cancer case from Aberdeen - that of Jim Stark - was left out of Mundt's analysis, and its inclusion "would not have significantly changed the results."

In fact, at least three cases - those of Willie Snow, who died in 1982; Gene Mayes, who died in 1984; and Stark, who died in 1993 - were excluded. (A handwritten Vista "cancer list" dated Sept. 16, 1993, includes Stark and Mayes but not Snow.)

A fourth Aberdeen worker - 47-year-old David Thompson - is suffering from the disease.

In its brochure, organized in question-and-answer format, Vista assured its employees that Mundt had found "no 'epidemic' of cancer, or of any other cause of death" at the three plants. Ambiguous information

Upon closer examination, however, some of the information in the brochure is, at the least, ambiguous:

Question: "What about the excess of pancreatic cancers?"

Answer: "Pancreatic cancer is very uncommon and is not associated with any known specific cause."

(In fact, pancreatic cancer has been associated with PVC processing; a 1993 Vista memo made note of a cluster of cases at a Union Carbide plant in New Jersey).

Question: "Did Dr. Mundt have any specific recommendations?"

Answer: "Dr. Mundt stated that smoking is a known cause of lung cancer and should be avoided."

(Some researchers believe that *vinyl chloride* and PVC dust also can cause lung cancer; the possible connection was reported by the International Agency for Research on Cancer in 1987.)

Given Jim Stark's 18-year tenure at the Aberdeen plant and his prominence in the community, his omission from the study seems odd. Mundt said that he learned of Stark too late to add him, but Stark's daughters are skeptical.

"They don't want to mar their statistics by including these men," said Luanne Thompson (no relation to David), an attorney in Aberdeen.

"If they acknowledge Dad, they'll have to acknowledge a lot more," said Lynette Stark, who teaches at the town's junior high school.

Jim Stark began at the plant in 1966, advancing to become manager of transportation. As such, he responded to numerous tank-car derailments that resulted in *vinyl chloride* releases.

In 1984 - shortly after Vista had taken over from Conoco and just days before he resigned - Stark reported, and was caught in, a huge leak from the plant itself.

Stark was given a clean bill of health after a physical in March 1993, said his wife, Eileen. Two months later he was diagnosed with a type of brain cancer known as glioblastoma multiforme, which some studies associate with *vinyl chloride* exposure.

That summer, his weight dropped from 155 to 82 lbs. He died, at 62, on Aug. 20.

"Dad was such a fighter, with a very strong sense of justice," Luanne Thompson said. "Watching him languish like he did - it was like they took away his dignity."

Vista officials said that Stark and other former Conoco workers will be included in an expansion of the cancer study, which Mundt hopes to finish by early next year.

Even if Vista became convinced that certain cancer deaths were work-related, "it wouldn't change our practices," said Tom Grumbles, the company's occupational health manager. "Exposures have been controlled tightly."

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