The Washington Post Magazine

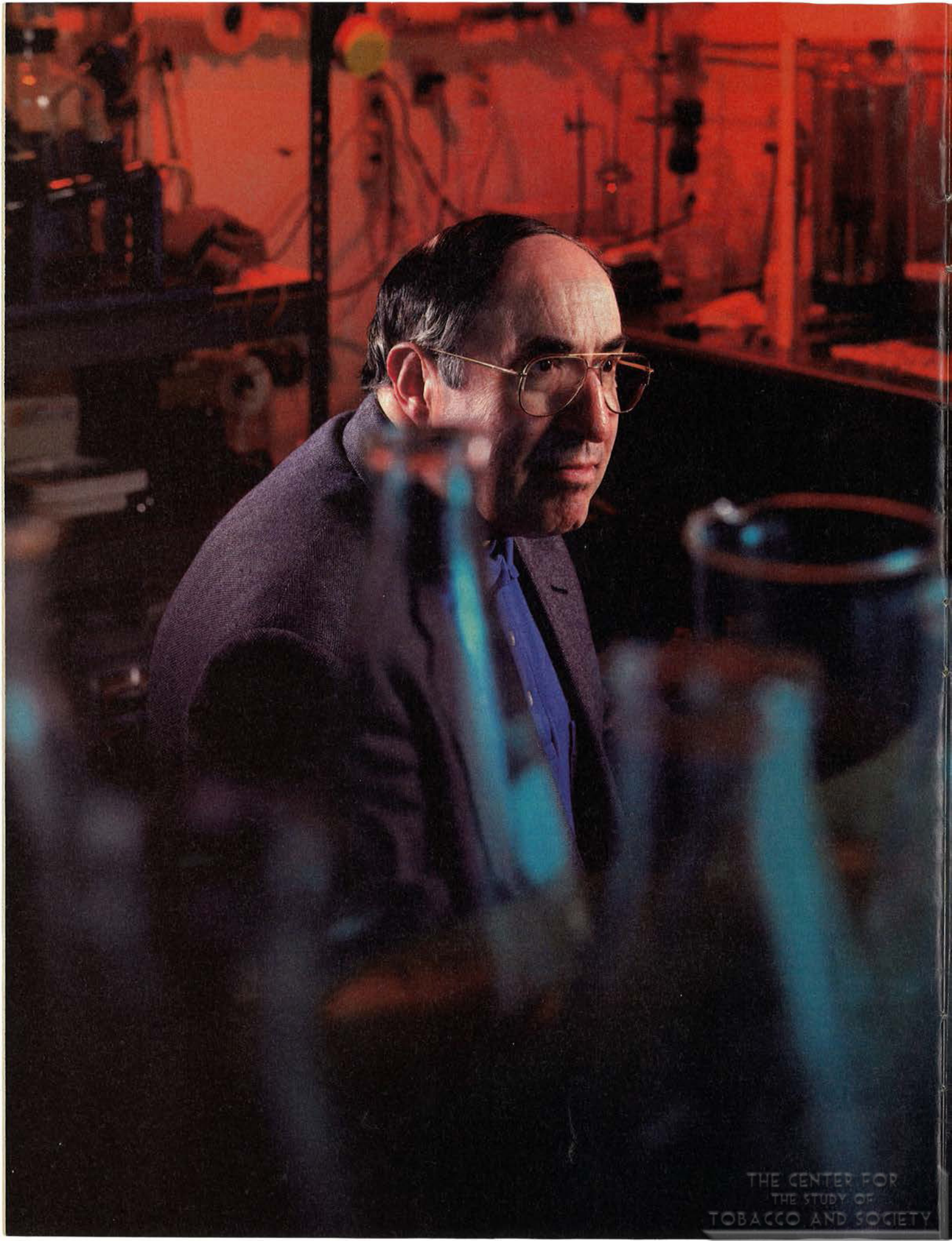
Safer Smoke

A researcher's quest, an industry's fear and one possible end to the tobacco wars

By John Schwartz

Plus: Tools of the Spy Trade

January 31, 1999



Reengineering The Cigarette

THE RESOLUTION OF THE TOBACCO WARS, SAYS WILLIAM FARONE, LIES IN MAKING SMOKING SAFER. AND THE SOLUTION TO THAT PROBLEM IS ALREADY IN THE LAB BY JOHN SCHWARTZ

PHOTOGRAPHS BY MICHAEL LLEWELLYN
William Farone, a former top scientist at Philip Morris, in his laboratory in California.

TOGETHER, the seven stone-faced tobacco executives raised their right hands and swore to tell the truth, the whole truth and nothing but the truth. Then, one after another, they said they didn't believe that tobacco caused cancer or other serious diseases. And that their companies did not manipulate nicotine levels in their products. And, one by one, the men sitting in a row before a House Energy and Commerce subcommittee uttered a third fantastic denial.

"I believe nicotine is not addictive, yes," said William Campbell, then CEO of Philip Morris USA. "Cigarettes and nicotine clearly do not meet the classic definitions of addiction," said RJR Tobacco Co. Chairman James W. Johnston.

And on down the line:

"I don't believe that nicotine or our products are addictive."

"I believe nicotine is not addictive."

"I believe that nicotine is not addictive."

"I believe that nicotine is not addictive."

"And I, too, believe that nicotine is not addictive."

Many Americans watching the April 14, 1994, hearing on C-SPAN believed the CEOs were lying. But one man, sitting in his living room in Irvine, Calif., *knew*.

William Farone knew because he'd spent eight years as a top scientist at Philip Morris, devoting himself to the creation of a safer cigarette, one that would provide smokers with the de-

sired jolt of nicotine at less risk to their health. In all his time at the company, Farone says, "I never heard anyone say that nicotine was not addictive or that smoking did not cause emphysema and cancer. The issue was more how it was involved in those diseases and how to reduce the risk."

Farone's first reaction to what he saw on the screen was anger. "I don't use profanity very often," he says now, "but I did then." As he watched, however, his frustration gradually gave way to unease. Farone, who'd been fired from Philip Morris a decade earlier, had spent the past few months quietly helping the Food and Drug Administration understand how tobacco companies manipulated nicotine in cigarettes. The information he'd shared was uncontroversial, he thought, nothing that the FDA investigators couldn't have found in public documents. But now here were the company executives, before Congress and under oath, denying everything Farone had been saying. "I realized I was in for a long road ahead," he recalls. "My efforts to help the FDA understand the science and technology were going to end with me on one side and the entire tobacco industry on the other."

William Farone is one of the least known of the former tobacco company officials to speak out against the industry in recent years, but his contributions to the historic debate over the fate of tobacco could prove to be the most important. Dependable and straightforward—especially within that troubled species known as whistleblower—Farone has given government officials and trial lawyers invaluable information on industry practices from the upper reaches of company research. "Farone was the diamond," says one government official who worked with him. "He outshone everybody."

Unsurprisingly, his former employers take a different view. Dan Webb, an attorney who represents Philip Morris, describes Farone as "a typical whistle-blower," a bitter former employee with "a motive to fabricate and to distort evidence through his hindsight."

But for a man who provokes such polarized appraisals, Farone has a distinctly moderate vision for an end to the tobacco wars. His continued commitment to the idea of a safer cigarette suggests there may be a middle ground between the combative stonewalling of the industry and the punitive prohibitionism of the most strident anti-tobacco forces.

What Farone—along with a handful of other veterans of the tobacco conflict—proposes is nothing less than a final resolution of the most heated public health debate of our time. He foresees a future where tobacco could be regulated like any of a variety of other consumer products—aspirin, say, or mouthwash. A future where tobacco companies could acknowledge and address the danger their products pose without fear of legal retribution. Where competition for market share, along with gradually escalating health standards, would, over time, make cigarettes less and less dangerous—and eventually even safe.

To most, the term "safe cigarette" seems an oxymoron—and an insidious one at that. But Farone believes that the research already exists to make cigarettes considerably safer. He should know, he notes, because he conducted much of that research himself.

Boy! Wouldn't it be wonderful if our company was first to produce a cancer-free cigarette. What we could do to the competition.—**mid-1950s memo from PR firm Hill & Knowlton, quoting an unnamed tobacco company research director**

APPLIED POWER CONCEPTS, the consulting company Farone founded after leaving Philip Morris in 1984, sits in an Orange County office park so nondescript that it looks like the place where buildings would end up after entering the Federal Office Park Witness Protection Program. Just down the hall from Farone's office, a shoe-box-shaped room that he shares with his business partner, John L. Dvorak, the babies of two staffers sleep in their cribs in a makeshift nursery; an attendant watches Jerry Springer on television with the sound turned low.

Farone himself strikes a less-than-heroic pose: He stands a bit stoop-shouldered, and his dark hair is thinning. He wears the kind of aviator frame bifocals that looked pretty cool around 1974; the frames show a thin line of scholarly tortoise shell. For a lunch-time interview, he suggests a small Mexican restaurant a few blocks from his office, where the specials cost less than $5.

Farone, now 58, grew up in Cortland, N.Y., not far from Syracuse. He was raised by Italian immigrant grandparents. He trained as a chemist at Clarkson University in Potsdam, N.Y., and worked at a number of companies, before winding up at consumer products company Lever Brothers, where he spent eight years testing the safety of products like Aim toothpaste and Mrs. Butterworth's pancake syrup and eventually rose to director of scientific research. After leaving Lever in 1975, he spent a year as an executive at a vegetable oil company before being recruited to Philip Morris.

Upon his arrival at the tobacco giant, Farone was charged with two tasks. The first, drawing on his Lever experience, was to seek out opportunities for Philip Morris to diversify into other consumer products. But most of his time, he says, was devoted to the second goal: finding ways to make cigarettes safer. "The accepted premise," he notes, "was the product had to be made less toxic."

With one exception . . . the individuals whom we met believed that smoking causes lung cancer, if by "causation" we mean any chain of events which leads finally to lung cancer and which involves smoking as an indispensable link.—**1958 report on a visit to U.S. and Canadian tobacco companies by scientists from British American Tobacco**

TODAY'S CIGARETTE is a high-tech marvel, as complex as a BMW and consistent as a Big Mac. Every mass-produced butt has been tweaked and prodded to ensure that it tastes just like every other one in the pack—and just like the ones you smoked a year ago.

Tear open a Marlboro and a complex blend of ingredients spills out. For starters, there are two principal varieties of chopped tobacco leaf once grown domestically but increasingly imported from abroad: yellowish "bright," historically grown in Virginia, Georgia and the Carolinas, and prized for its gentle flavor; and darker, more nicotine-rich "burley," from Kentucky, Ohio, Missouri and West Virginia. These are mixed with other tobaccos, chiefly "oriental," which is imported primarily from Turkey. It is higher still in nicotine, but harsh enough that it's used sparingly. To overcome seasonal variations in crop flavor, each cigarette is blended from tobaccos harvested over three consecutive years.

Along with the tobacco blend, the modern cigarette contains a variety of fillers that vary from brand to brand. Mixed in with the chopped leaf, for example, are strips of paper-like tobacco filler. Just as Native Americans used every part of the buffalo, today's big cigarette manufacturers use every bit of the tobacco leaf, recycling what would otherwise be waste and dust into filler. At Philip Morris, for example, factories take stems and smallish bits of tobacco and run them through papermaking machinery. First, it agitates the tobacco bits in hot water, removing much of the nicotine and other syrupy compounds that would gum up the works. It then presses the fiber into long sheets to which this extract is then reapplied, along with a soup of chemicals that includes flavorings, preservatives and humectants (moisteners). The resulting "reconstituted leaf," or RL, looks a lot like the brown paper that grocery bags are made of.

Tear open a Marlboro and a complex blend of ingredients spills out. Every mass-produced butt has been tweaked and prodded to make sure it tastes just like every other one.

Then there's "blended leaf," an older filler process in which burley stem and tobacco dust are blended into sheets that are held together by the leaf's natural gums; those sheets, like RL, are cut into leaf-shaped scraps and stored. A final set of fillers known as "puff" is made by expanding tobacco scraps with water or steam (or, in some cases by freezing them with liquid carbon dioxide and then flash-heating them) until they come out looking like Rice Krispies. The ratio of tobacco to filler varies from brand to brand, depending on the flavor and other characteristics the manufacturer wants. High filler content, for example, makes for a less-dense cigarette with lower delivery of "tar," the catchall name for toxins in tobacco smoke.

Print ads in the 1930s and '40s flirted with health claims.

All these components come together at the final manufacturing plant. For Philip Morris, this is its Richmond mother ship, visible from I-95 just south of the city, which spits out as many as 600 million cigarettes each day. Huge machines mix the oriental and bright tobaccos together under a spray of light flavors and humectants. The burley leaf, which holds flavors best, gets a spray of its own that contains sugar, chocolate, licorice and other ingredients. The burley gets mixed with the reconstituted and blended leaf papers, and the mounds travel through a cutter. That production line joins with the bright and the puffed filler to receive a final mist containing more flavorings, as well as some of the hundreds of other additives that go into tobacco blends—from glycerol (for moisture) to ammonia-bearing compounds. (Ammonia is a contentious issue: The companies say they add it at various stages of the process to bring out a smoother flavor. But critics argue that the companies use ammonia to boost the cigarette's nicotine kick.)

This final blend is then rolled in paper in a continuously extruded tube and then chopped into neat segments and "tipped" with a filter. The company uses different papers for different blends, one of several ways it keeps within the nicotine and tar limits it files with the Federal Trade Commission for each brand; if the current tobacco crop is coming along a little strong, more porous paper will let more air into the cigarette, diluting the smoke and allowing less nicotine and tar get to the lungs.

But as beautifully designed and rigorously manufactured as it is, today's cigarette hasn't really advanced on one front: It still kills those who use it in the same ways and with the same efficiency as its primitive ancestors.

There are biologically active materials present in cigarette tobacco. These are: a) cancer causing b) cancer promoting c) poisonous d) stimulating, pleasurable, and flavorful.—**1961 confidential memo to Liggett & Myers tobacco company by an outside consulting research firm**

CIGARETTES LAUNCH an all-fronts assault on the body. The toxins in smoke irritate the tissues of the lungs, causing the cells there to multiply and thicken the way calluses form on a shoe-rubbed heel. Gradually, the lungs lose their elasticity and become less able to take oxygen into the body. Smoke also disables the cilia—tiny, hairlike filaments that line the major airways and help move contaminants up and out of the lungs. This accumulated damage often leads to chronic bronchitis and emphysema.

Smokers also suck in a great deal of carbon monoxide, a byprod-

uct of burning that's best known as the major poisonous component of car exhaust. Carbon monoxide readily attaches itself to hemoglobin, the molecule in blood that normally carries oxygen throughout the body, making the heart work harder to keep cells supplied with oxygen. Meanwhile, other components of smoke damage the lining of blood vessels. Over time, the heart becomes enlarged and weaker and the circulatory system deteriorates, leading to such symptoms as heart attack, stroke and even male impotence.

Most of all, of course, there's cancer, which was the focus of Farone's research at Philip Morris. Cigarette smoke doesn't cause cancer in any single way, but rather contains a variety of carcinogenic compounds that he breaks down into four main categories:

- Nitrosamines, the most dangerous group, which form when naturally occurring alkaloids like nicotine combine with nitrogen compounds such as those found in fertilizer.
- Aldehydes, which are formed by the burning of carbohydrates such as the sugars added to tobacco and the cellulose that makes up a substantial part of the leaf.
- Polycyclic aromatic hydrocarbons, which are created when carbon materials burn in the absence of oxygen (a process that occurs behind a cigarette's burning tip).
- Traces of heavy metals such as radioactive polonium 210, which find their way into tobacco plants through contaminated fertilizer. Although these metals can be found in food as well, the gut is better protected than the lungs against toxins, in part because foreign substances move more quickly down the digestive highway than through the cul-de-sac of the lung.

Researchers believe this cocktail of chemicals triggers cancers by disabling the body's mechanisms for inhibiting the rampant cell growth cancer causes. Waun Ki Hong, professor and chairman of thoracic oncology at Houston's M.D. Anderson Cancer Center, says the chemicals in cigarette smoke disable the p53 gene, which suppresses tumor growth. In addition, the smoke seems to disable the genes that set off the process within each cell known as apoptosis, or programmed cell death, another of the body's ways of getting rid of malignant cells. This biological double whammy, says Hong, turns off the two best defenses the body has against cancer.

Ironically, the most contentious chemical in cigarette smoke—nicotine—is not considered particularly dangerous by most scientists. Nicotine can be poisonous in large doses—it acts as a natural pesticide in tobacco plants—and some research suggests it might contribute to the formation of carcinogenic nitrosamines. But in the doses conveyed by smoking, its health risks are generally considered small. In the eyes of many scientists, nicotine is no more dangerous than caffeine, another addictive substance that, for most people, is considered safe.

A jolt of nicotine speeds up the user's heart rate by about 15 percent and temporarily increases blood pressure by 10 to 20 points. Moments after this initial amphetamine effect, however, the drug causes an equally powerful sedative reaction, blocking the initial stimulation and slowing heart rate back to its previous level. Over time, this constant up-and-down metabolic tinkering can contribute to smoking's toll on the heart and circulatory system.

Ultimately, though, nicotine is controversial not because of the limited health risk it poses but because of its addictiveness. It's what keeps smokers smoking, and ingesting all the other toxins in cigarette smoke. There are only two solutions to this public health dilemma: Stop people from smoking altogether—in some cases with the help of nicotine replacement devices—or create a cigarette that will do less harm. Bill Farone, working for Philip Morris, took the latter path.

Any action on our part, such as research on the psychopharmacology of nicotine, which implicitly or explicitly treats nicotine as a drug, could well be viewed as a tacit acknowledgment that nicotine is a drug. Such acknowledgment, contend our attorneys, would be untimely.
—1980 Philip Morris memo by William L. Dunn Jr., head of the company's "smoker psychology" group and known in-house as "The Nicotine Kid"

THE QUEST FOR A SAFER CIGARETTE predates the first public revelations of the health risks of tobacco. In 1963, six months before the first surgeon general's report on smoking came out, attorney Addison Yeaman of Brown & Williamson Tobacco wrote a bracingly frank memo outlining an initiative to confront tobacco problems squarely: Admit the health risks, he urged, and redouble efforts to reduce the risk in cigarettes. "In the meantime," Yeaman wrote, "(we say) here is our triple, or quadruple or quintuple filter, capable of removing whatever constituent of smoke is currently suspect while delivering full flavor—and incidentally—a nice jolt of nicotine . . . And if we are the first to be able to make and sustain that claim, what price Kent?" Yeaman was no corporate loose cannon: He would later become Brown & Williamson's CEO.

At about the same time that Yeaman was suggesting a health initiative at Brown & Williamson, Helmut Wakeham was urging Philip Morris to do the same. In 1964, Wakeham, then vice president for research and development, called on his company to produce cigarettes that were "biologically approved on all major health questions."

Neither initiative went far. Wakeham, now retired, told author Richard Kluger that his efforts to get his company to perform the biological research necessary to make safer cigarettes were thwarted by Philip Morris lawyers, who feared that an admission of the dangers of smoking would invite lawsuits. "The legal department's view of it," Wakeham told Kluger, "was that you couldn't be criticized for not knowing something."

Or, as a former Philip Morris researcher told Kluger: "Lawyers look at the problem in a different way, and so we go through this ritual dance—what's proven and what isn't, what's causal and what's just an association—and the lawyers' answer is, 'Let's stonewall.' "

Researchers versus lawyers; this internal conflict has defined the modern tobacco industry.

Bill Farone didn't know this history when he arrived at Philip Morris's Richmond complex in 1976. At first, he thrived. After just one year as a staff scientist, he was promoted to director of applied research, with 150 people under him. Meanwhile, his ongoing search for a safer cigarette took him in many directions. He tried using cobalt in filters to reduce carbon monoxide and bred special bacteria to eat cancer-causing nitrosamines. He even considered "beneficial" additives for cigarettes that might help smokers lose weight or treat illness.

As his work progressed, Farone tried to learn everything there was to know about cigarettes. But it wasn't easy. Science was approached differently at Philip Morris than it had been at Lever Brothers. At his old job, products were tested for safety all the time. The test results were readily shared in-house, and often presented to the federal government so that the company could make health claims for its products.

But at Philip Morris, secrecy was maintained even between in-house labs. Whenever Farone needed to run a test on the biological effects of one of his projects—to determine, say, whether a new process would reduce the risk of cancer in animals—he had to go to Thomas Osdene, who ran the company's biological research division. Osdene would oversee the tests himself, and after a few weeks or months would brief Farone on their outcome—but almost always orally. Nothing was delivered in writing. *continued on page 21*

Ultimately, nicotine is controversial not because it's particularly dangerous but because it's addictive. It's what keeps smokers smoking, and ingesting all the other toxins in cigarette smoke.

CIGARETTES

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"I never in most of the cases ever got to actually see the results," Farone testified in Washington state's case against the tobacco industry. Once, when Osdene was reading results to him off of a sheet of paper, Farone asked for the pages themselves. "You can see this result," Farone remembers Osdene responding, "but I have to destroy this information because it's not supposed to be here."

In fact, most of the biological tests that Farone requested were actually performed in Europe by a Philip Morris-owned lab known as Inbifo. Osdene and others told Farone that research into smoking and health was conducted abroad in order to keep potentially controversial scientific work outside the scope of American litigation and U.S. regulatory agencies.

Over time, Farone says, he realized that little of his work was being incorporated into products. He began to see a pattern: Some projects that he worked on, such as a money-saving laser system for punching tiny ventilation holes into cigarette paper, were implemented quickly. But others—technologies that would make smoking safer—dragged on for years with no progress. "The general excuse is that these programs led to products that were not 'consumer acceptable,'" Farone would later write.

Gradually, the lawyers seemed to exert greater and greater control over what kind of research the company could pursue. In the summer of 1983, attorneys working for Philip Morris wrote a memo critical of the work of Victor DeNoble, a company scientist who had been studying nicotine's addictiveness: "Research engaged in, as well as some possibly under consideration, by Philip Morris has undesirable and dangerous implications for litigation positions the industry takes in regard to smoking behavior. In the final analysis, the performing and publishing of nicotine-related research clearly seems ill-advised from a litigation point of view." Shortly after, Philip Morris closed DeNoble's lab and moved him out the door. Word spread through the ranks of the scientists that research that might hurt the company in litigation would be stopped, and data collected from such research in the past would no longer be kept.

Despite this warning, Farone still believed he would be able to continue his research into a safer product. In December 1983, Max Hausermann, the company's vice president of research and development, told Farone he would be stepping aside within the year, and that Farone would get his job overseeing all 600 of the company's scientists. Hausermann even announced the upcoming promotion to the research staff. But six months later, Farone was called into a meeting with Hausermann and told that management at

Farone was called into the office of a Philip Morris executive: He was being terminated for 'irreconcilable differences' with management and an 'attitude of insubordination.'

the company had changed, and Farone would no longer be getting the job. Hausermann suggested to Farone that he hire a lawyer.

At the time, Farone thought he was being bypassed because his wife, who also worked for Philip Morris, had filed a sex discrimination complaint against the company. He and his lawyer drafted a letter to Philip Morris saying that he was prepared to file a discrimination complaint with the Equal Employment Opportunity Commission. "Dr. Hausermann advised me to do this," Farone would later say. "I thought I was following the correct procedure for resolving disputes."

Philip Morris saw the matter differently. Within a week, Farone was called into the office of Philip Morris executive Barry Case. Hausermann was also there, having been summoned back from a Canadian vacation in order to attend the meeting. Case began by reading a letter addressed to Farone: He was being terminated for "irreconcilable differences" with management and an "attitude of insubordination."

Farone looked over at his old friend Hausermann and said something odd: "*Alea jacta est*"—the die is cast. It was the phrase that Julius Caesar uttered when he crossed the Rubicon to launch a civil war in Rome. Farone says he was simply telling his scholarly friend, a fellow Latin buff with whom he often traded classical epigrams, "I'm gone, I'm history."

Philip Morris, for its part, viewed the statement as a threat.

It is well recognized within the cigarette industry that there is one principal reason why people smoke—to experience the effects of nicotine, a known pharmacologically active constituent in tobacco.—**William Farone in his 1995 FDA statement, "The Manipulation and Control of Nicotine and Tar in the Design and Manufacture of Cigarettes: a Scientific Perspective"**

UPON LEAVING PHILIP MORRIS, Farone stuck with what he knew best: chemistry. Together with his business partner, John Dvorak, he formed a consulting firm to help corporations solve scientific problems. The firm's multimillion-dollar projects have included such varied challenges as developing methods to dispose of rice straw by turning it into water, sugar and easily disposable chemicals, and cleaning up chemical spills with toxin-eating microbes.

And that's how it might have stayed, Farone says, if Gary Light, an investigator from the Food and Drug Administration, hadn't called him in December 1993. David Kessler, then commissioner of the FDA, wanted to extend the agency's authority to encompass tobacco products, and Light was cold-calling former Philip Morris employees looking for potential whistle-blowers.

Like most departing Philip Morris employees, Farone had signed an agreement not to disclose the company's secrets. But when Light approached him, he agreed to explain basic tobacco science to FDA investigators. "It didn't really occur to me that I was doing anything more than providing information" available to anyone who cared to dig, Farone says now. Everything he was explaining—the manufacture of cigarettes, nicotine chemistry, how companies might increase the punch of their products—was in publicly available literature.

But for FDA investigators trying to make sense of the bewildering arcana of cigarette manufacture, Farone proved a gold mine.

The FDA gave him a code name—Philip—and over the following months, Farone patiently explained the science again and again to a series of investigators and FDA officials. "It was Cigarettes 101," says Mitch Zeller, who headed the agency's inquiry. "He was more of a teacher than anything else, very patiently explaining the fundamentals of how you make a cigarette." Even more important, everything Farone said checked out. Unlike many whistle-blowers, Zeller says, Farone "just stuck to what he knew. If he didn't know something, he'd say, 'I don't know.' "

The FDA was not alone in taking a closer look at the tobacco companies. By 1994, state officials in Mississippi, Minnesota and elsewhere were filing lawsuits against the industry to recoup money spent to treat tobacco-related illness. A new wave of private attorneys was also preparing class action suits accusing the industry of hiding the addictive nature of nicotine and hooking generations of smokers. Thanks in large part to these suits, damaging confidential documents began leaking out in a flood. An industry that once seemed impregnable was abruptly vulnerable and defensive.

Within the Clinton administration, the Environmental Protection Agency, the Occupational Safety and Health Administration, the Justice Department and the Federal Trade Commission all were looking into tobacco. And in Congress, Rep. Henry Waxman (D-Calif.) pulled together an investigation of his own—with FDA support—to present a series of dramatic hearings on industry practices.

It was during one of those televised hearings—on April 14, 1994—that Farone watched the tobacco executives swear they did not manipulate the nicotine in cigarettes. "I'd just spent a year telling the FDA how we did it and why it was a good thing to do," says Farone. "That's when I decided I was going to the mat on this thing."

After the FDA announced its proposal to regulate tobacco products in the summer of 1995, the agency asked Farone if he would be willing to go public. Zeller flew out to Southern California to meet Farone face to face, and over lunch at the same cheap Mexican restaurant he still frequents, Farone agreed to file a statement countering the tobacco executives' claims. He argued that manipulation of nicotine was not only commonplace in the industry, but smart: "If we accept the premise—as the cigarette industry surely does—that cigarettes are a nicotine delivery system, and that current laws do not forbid the self administration of nicotine via smoking by adults, then it becomes a desirable technical challenge to decrease the 'tar' in a cigarette while maintaining the delivery of nicotine . . . Minimizing the exposure to the potential negative health effects of the undesirable chemical components in tar while maintaining an acceptable and pharmacologically active nicotine level is thus a valid and useful technical challenge that I and many of my former colleagues considered a top priority."

If the companies would open up their research to public scrutiny and submit to government regulation, Farone argued in closing, the result would be a safer cigarette: "Rather than restrict the options of what companies could do, agreement between regulators and industry would open up entirely new options for cigarette consumption and progress in the industry."

Since going public, Farone has tried to maintain a relatively low profile, even while giving testimony and depositions in a number of tobacco cases. He talks to reporters regularly, but generally asks them to leave his name out of their stories. Still, his fingerprints can occasionally be found on recent tobacco revelations. Last August, when a federal judge ordered the EPA to withdraw its declaration that secondhand smoke is carcinogenic, it was Farone who directed reporters to documents suggesting that some carcinogens in smoke are actually *worse* for secondhand recipients. In a feisty essay on secondhand smoke written at the urging of anti-tobacco activist Clifford Douglas and distributed to reporters, Farone argued that the industry had been "withholding the information about the potent carcinogens in environmental tobacco smoke," and compared such smoke to "poison gas."

Mild-mannered Bill Farone was now at war with the industry he had once served.

The cigarette should not be construed as a product but a package. The product is nicotine . . . Think of a puff of smoke as the vehicle of nicotine.—**William Dunn, early 1970s Philip Morris memo**

IS IT POSSIBLE to make a safe cigarette?

"Forget safe," Bill Farone insists, leaning across the faux wood-grain formica table in his tiny conference room and technical library. "Let's just talk about moving in that direction by making something safer. We'll get there incrementally, by making it marginally safer."

The most important goal, Farone says, is to reduce tar while maintaining the delivery of nicotine—if necessary, by adding it to the tobacco. Conventional low-tar cigarettes, he argues, have the problem of being lower in nicotine as well; in order to get the desired "hit" of nicotine, smokers subconsciously compensate—they puff more often, draw the smoke more deeply into their lungs, and hold it in longer—arguably resulting in higher overall risk. [See story, this page]. Smoke from today's cigarettes—regular and low-tar alike—generally contains about 10 times as much tar as it does nicotine. But Farone believes that it would be possible to produce cigarettes where that ratio would be closer to 3 to 1, for starters. Not altogether safe, certainly, but a good deal safer.

Farone argues that the companies can ratchet down the risk one toxin at a time. Nitrosamines, he says, could be removed by getting tobacco farmers to use less nitrogen-based fertilizer. Or by introducing toxin-eating bacteria into the production phase that makes cigarette filler. Or by treating the tobacco leaf with liquid carbon dioxide at high pressure. This last method was used by Philip Morris to pull nicotine out of a nicotine-free experimental brand called Next in the early 1980s. The $300 million project was a flop—people in the test market wanted their nicotine. But Farone says the company's mistake was losing the nicotine altogether: Take everything out, he argues—the nitrosamines, the nicotine, everything—but then put the nicotine back in and you'll have a safer product that people would still smoke.

To deal with toxic aldehydes, Farone suggests a charcoal filter in the middle of the existing filter, which would have the added advantage of cutting carbon monoxide. To cut down polycyclic aromatic hydrocarbons, manufacturers could lower the temperature of the coal at the tip of the cigarette, possibly by increasing air dilution with more porous filter paper and less dense blends of tobacco and filler. And to get rid of polonium contamination, they could screen incoming tobacco crops for the heavy metal and reject any shipment with unacceptably high levels.

Farone acknowledges that this kind of tinkering could have an adverse effect on cigarette taste, but he views this as simply another technical challenge to overcome—one that

Are 'Lights' Safer?

FOR DECADES, tobacco companies have engaged in a delicate dance where health and marketing are concerned. They can't assert that a given cigarette is safer than others on the market, because that would be a health claim that could subject them to FDA regulation and possibly invite smoker lawsuits. But they have made great efforts to *imply* that certain advances—primarily low-tar cigarettes and the new no-additive brands—make their products safer than the competition's. The current champion of this implied-safety derby may be Brown & Williamson's ad campaign for the new, no-additive Kool cigarettes: "We're not saying these cigarettes are safer than other cigarettes, but we think you'll enjoy the perfectly balanced taste."

So, are low-tar or no-additive cigarettes safer than other brands? The answer is probably not.

Today, low-tar cigarettes—basically, any brand that calls itself "light" or "ultralight"—account for nearly two-thirds of all American cigarette sales. The primary reason, according to Lynn Kozlowski, a professor in the Department of Biobehavioral Health at Pennsylvania State University, is that smokers assume they're safer. Kozlowski says that his surveys show that most smokers do not know how much tar their brand delivers, but nearly all know whether they buy light, ultralight or regular. They tend to believe that the word "light" means "safe," Kozlowski says. "Light is a powerful word."

But medical researchers say that in practice low-tar cigarettes aren't any safer than today's full-strength varieties—and in some cases they may actually do more damage. For starters, the difference in tar delivery between full-flavor and low-tar brands isn't very pronounced. "It's sort of like the difference between jumping off a 15-story building and a 20-story building," says Kozlowski.

Adding to the risk posed by low-tar brands is smoker "compensation." Cigarettes with lower tar also generally have less nicotine and lighter flavor, so smokers compensate by inhaling more deeply, puffing more often and sometimes subconsciously covering up the microscopic holes near the cigarette filter that are intended to dilute the smoke. Because low-tar smokers tend to take smoke deeper into their lungs, the most noticeable shift since the cigarette market went "light" is that the resulting cancers have moved from the main airways of the lungs to the innermost reaches, "giving birth to a different pattern of cancers," Kozlowski says.

No-additives cigarettes, a trend pioneered by smaller cigarette makers and since adapted to major brands such as RJR's Winston, are another idea that sounds good in theory but probably doesn't mean much when it comes to health. First of all, it's not clear how much cigarette additives increase risk. The industry has long argued that the nearly 600 additives that go into various tobacco blends—from chocolate and licorice for flavor to glycerol for moisture—all appear on the FDA's list of foods that are "generally recognized as safe." Critics point out, however, that the FDA list concerns the effects of these substances when we *eat* them, not when we *smoke* them. There is little or no research regarding the health risks of most of these additives when they are burned and taken into the sensitive lungs.

More important, whatever the health risks posed by cigarette additives, researchers point out that they pale in comparison with the lethality of tobacco, however pure it may be. Additives or no additives, tobacco smoke kills.

Lately, the two largest American tobacco companies, Philip Morris and RJR, have test-marketed cigarettes that heat tobacco without burning it; the resulting smoke provides nicotine but substantially less tar than conventional cigarettes. Accord, from Philip Morris, works with a small electronic device that resembles a beeper; Eclipse, from RJR, looks more like a cigarette but still takes some getting used to for smokers, who sometimes struggle to light the charcoal tip and keep it burning bright.

Tobacco industry analyst Gary Black of the Wall Street brokerage Sanford Bernstein & Co. says that as long as cigarettes like Eclipse are difficult to smoke, they will likely languish. Smoking, he says, is "one of the simple pleasures. It's like sex—you don't want to have to read a manual to be able to do it." —J.S.

the companies already deal with all the time. Nicotine, for example, is a bitter chemical, and adding it to cigarettes can make them harsh and distasteful. But Farone points to experiments during his time at Philip Morris, where that bitterness was overcome with glycerol, a chemical that's already used to keep tobacco moist and pliable during cigarette production. Increasing the glycerol and other flavor-smoothing chemicals could be the spoonful of sugar that helps the nicotine go down.

The tobacco companies argue that they have repeatedly test-marketed innovative, high-tech cigarettes along the lines of Farone's suggestions, but these efforts have been overwhelmingly rejected by consumers. In the past few years, for example, both Philip Morris and RJR have introduced less-toxic cigarettes—cautiously, and without making explicit health claims—that heat tobacco without burning it. (The Philip Morris cigarette, being test-marketed in Richmond and other cities, is called Accord; RJR's Eclipse is currently available in Lincoln, Neb., and elsewhere.) Philip Morris attorney Dan Webb argues that such products "could revolutionize smoking in America" but says that in general high-tech cigarettes like these don't click with smokers, who are put off by their complexity as well as their taste.

Moreover, the tobacco companies insist that even if they did produce a good product with lower health risks, it would only open them up to legal attacks by anti-tobacco forces—the same argument that has pitted tobacco lawyers against researchers for more than three decades.

"You saw what the public health community did to Premier," says Webb, referring to a precursor to Eclipse that RJR test-marketed in the late 1980s. "They absolutely destroyed that product!" When Premier was released, anti-tobacco activists immediately asked the FDA to declare Premier a drug delivery device and assert regulatory authority over it. RJR withdrew the product before the FDA could rule. Two years later, activists called for FDA regulation of Next, Philip Morris's experimental no-nicotine cigarette; it, too, was withdrawn.

Some observers have gone so far as to claim that the anti-tobacco forces and trial lawyers are responsible for the lack of safer cigarettes on the market. "Our legal system is the reason the intensely competitive cigarette industry, unlike all others, does not seek to win customers with better products," wrote columnist Holman W. Jenkins in a Wall Street Journal op-ed last month. "If the automobile had remained as dangerous as it was 35 years ago, last year's highway death toll would have been 135,000 rather than 41,500. Do we suppose unfettered competition among makers of nicotine delivery systems could not have accomplished a similar degree of technological progress?"

Anti-tobacco activists place the blame squarely on the companies: "Whatever else one wants to say about the anti-tobacco trial lawyers," says Clifford Douglas, "it's clear they have done nothing but hold the industry's feet to the fire, now making it far more likely that the industry will be forced to produce the safer product they should have made available to the public many years ago."

The original $368.5 billion deal to settle state suits against the tobacco industry proposed in June 1997 presented one potential solution beyond this circle of blame. That agreement offered the industry considerable legal protection and included strong provisions to ensure that safe cigarette technology researched by the companies would be brought into the open, shared and developed under the authority of the FDA. "We wanted to knock down that so-called barrier," says Washington state Attorney General Christine Gregoire. Good public policy, she argues, called for an immunity arrangement so that the companies' "researching and producing and selling a reduced-risk product could not be used against them."

Of course, that's not how things turned out. As the settlement proposal was transformed into legislation, anti-tobacco activists opposed the notion of providing any measure of legal protection to the companies they described as "merchants of death." As the bill made its way through committee, lawmakers stripped out immunity and added further fees and restrictions. Incensed, the industry walked away from the process—and then spent more than $40 million on advertising to kill tobacco legislation altogether.

When the states suing the tobacco industry finally settled their cases last fall for $206 billion, immunity wasn't part of the agreement. The states got the money, the industry got rid of 46 troublesome suits, and smokers got a 45-cents-per-pack price hike to pay for it all. But prospects for a safer cigarette remain slim.

Nonetheless, Farone is hopeful. This spring, the Supreme Court will likely decide whether to hear arguments about the FDA's attempt to regulate tobacco. If the justices eventually rule in favor of the agency, then the FDA could assert broad authority over the design, manufacture and marketing of cigarettes.

The industry remains vehemently opposed to such regulation, arguing that if federal bureaucrats get control over tobacco they will ban it or dramatically restrict its sale. "The American public is not going to tolerate cigarettes being sold in a fashion regulated by the FDA," argues Webb, suggesting that the agency might allow tobacco to be sold only by prescription.

But such extreme scenarios seem unlikely. Throughout the tobacco battles, Kessler himself repeated the words "Prohibition doesn't work" like a mantra. Agency officials say that if the FDA does get regulatory authority, they will work with the companies to find ways to make cigarettes safer. Once such techniques are developed, they add, the agency might eventually mandate their use.

It would not be the first time that the government tried to work with the tobacco industry. During the 1970s, when tobacco was a less-polarizing issue, the National Cancer Institute embarked on research with the industry on safety issues. Public health groups, however, eventually became disenchanted with that effort, which they said had been co-opted by the companies.

Farone still believes that middle ground can be found today, even suggesting that if the Supreme Court rules against the FDA, the industry should submit to such regulation voluntarily. This strategic turnaround, he argues, would enable the companies to openly research ways to make cigarettes safer. And, he notes, any company that produced a less hazardous cigarette could finally make that health claim in advertisements—and seek the huge marketing advantage predicted more than 35 years ago in Addison Yeaman's "what price Kent?" memo.

In fact, even without the immunity envisioned in the original tobacco deal, the companies may find that the legal climate has changed enough for them to consider such a bold shift in strategy. The suits brought by the states are safely settled. Federal courts have sharply restricted the ability of trial lawyers to launch large class action suits, and state-by-state tort reform efforts—funded in part by the tobacco industry—have restricted the use of punitive damages and other litigation risks. And because the courts have ruled that the 1965 addition of cigarette warning labels gave smokers adequate notice of health problems, the pool of potential plaintiffs against the industry is dwindling.

Farone believes that if, from the beginning, the companies had listened as much to the researchers as they did to their lawyers, things would have turned out very differently—for the industry and for public health. "If they had come clean, we wouldn't have an issue," he argues.

But the companies didn't come clean. And so, almost 15 years after Philip Morris fired him, William Farone is still trying to prove that his research, if put into practice, could greatly reduce the hazards of smoking. He says he's doing it to reduce the annual body count: "The issue is quite simply 400,000 deaths per year. If you have a chance to do something about it, you have to do it."

But surely, there is another motivation at work here, more urgent than ambition or even than the desire to save lives; Farone seems to want, some day, to be able to say *I told you so.*

"The work we did at Philip Morris is good," he says, almost pleadingly. "So why didn't we use it?" ■

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