



Childhood Cancer Clusters in California's Central Valley

This case study examines two clusters of childhood cancers in the California agricultural communities of McFarland and Earlimart. As often the case, local residents (as well as many environmental and health activists) suspect that the cancers are the result of a particular contaminant—here, the pesticides that are used on the farms in the vicinity of the communities. As explained below, however, years of epidemiological research has yet to produce a “smoking gun.”

McFarland

McFarland is a small farming community of about 6,200 in Kern County, which is located at the southern end of California's San Joaquin Valley. It is nestled amidst the valley's cotton fields and almond groves. According to the 1980 census, 75 percent of McFarland's residents were of Hispanic origin with a relatively high proportion (40%) under the age of 18. Twenty-eight percent of the population was foreign born, mainly from Mexico, and 73 percent did not speak English at home. Many of its residents are employed in agricultural work. Many are poor, with inadequate health insurance and a per capita annual income in the 1980's of about \$4300.

From 1978 to 1990, 14 children in McFarland were diagnosed with childhood cancer—four times the expected rate. On one street, there were five cases—out of 17 homes. The cancers were of many different types including liver, kidney, eye, adrenal glands, and bone. By 1992, five of the children had died. Although no new cancer cases were diagnosed in 1990 and 1991, another seven cases were diagnosed between 1992 and 1995—three more cases than would

Barton H. (“Buzz”) Thompson, Jr., Robert E. Paradise Professor of Natural Resources Law, and Flora Y. F. Chu, Lecturer, Stanford Law School, prepared this case study as a basis for classroom discussion rather than to illustrate either effective or ineffective handling of an environmental matter. Some or all of the characters or events may have been fictionalized for pedagogical purposes. Copyright © 1998 by the Board of Trustees of the Leland Stanford Junior University. To request permission to use or reproduce case materials, write to Environmental and Natural Resources Law and Policy Program, Stanford Law School, 559 Nathan Abbott Way, Stanford, CA 94305 or visit www.stanford.edu/group/law/library/casestudies/.

have been expected between 1990 and 1995 based on general population statistics.

Earlimart

Earlimart is another small farming community with an adult population of 3,000 and a child population of about 1,050. It is surrounded by vineyards and is situated in southern Tulare County about 15 miles north of McFarland in the San Joaquin Valley.

In 1989, the United Farm Workers union uncovered a second cluster of twelve childhood cancers in Earlimart among children of farm workers. Dr. Marion Moses, a medical consultant for the union, claimed that the cancers occurred in Earlimart at a rate 12 times higher than statistics for the general population would have predicted. State government officials later concluded that there were six cases—two and half times the expected rate. The cancer cases were not all of the same type, but included leukemia, lymphoma, and kidney cancer.

“In adults, when you get different types of cancer, then most of the time it is not a cluster,” Eva Glazer, medical epidemiologist with the State Health Department, stated. “In children, that's more debatable. Cancer is rare in children, so one is concerned about an excess number even if they are not all of the same type.”

As of 1992, two of the children had died.

The Community Environment

Most growers view pesticides as a necessary part of farming. In Earlimart, pesticides are always present in the vineyards and other agricultural operations where the parents work. Children are exposed to them when they play outdoors, when they drink the water, or when they touch their parents returning from the fields.

McFarland is surrounded by cotton fields. Since the town is only 10 blocks wide, no location in the city is farther than five blocks from fields where aerial and ground application of pesticides and herbicides frequently occur. Drinking water also has a history of contamination by pesticides. The local elementary school and a housing development for farmworkers are built near what one resident describes as a former pesticide dump. Residents in or near the housing development have complained about seizures, brain lesions, kidney and bladder problems, hair loss, premature gray hair, chronic diarrhea, and skin rashes.

Families of Cancer Victims

Families of cancer victims have blamed pesticides for the childhood cancers. “If it is not the pesticides, what is it?,” asks one of the mothers of a cancer victim. “We live in the fields. We are the fields. Our immune system is constantly under attack. Cancer in children is totally abnormal. The state tries to treat it like it is a measles epidemic or something. Something that will just go away. It won't.”

Daily during the growing season and harvest, farmworkers and their children labor in fields, vineyard, and orchards that are sprayed repeatedly with various pesticides. Often farmworkers are not told when spraying is to be done or what type of health hazards the pesticides pose. Often they live in trailers and shacks on the edge of the fields, where the chemicals, particularly during aerial spraying, can drift and land in the dirt where children play.

Many farmworkers report getting sick suddenly in the fields with such symptoms as nausea, eye irritation, lip swelling, and swollen and burning arms and legs. Workers get sick often, and many of their children complain of allergies.

The cases of Miriam, a cancer victim from Earlimart, and John, a cancer victim from McFarland, typify the conditions that farm worker families live under and the dilemmas that they face. Both of Miriam's parents are farmworkers and believe that pesticides were responsible for her illness and death. Her mother worked in wine grapes until she was seven months pregnant and then returned to work after she was born. Miriam's mother would come home after work with pesticides still on her clothes and would pick up her baby. They lived in a rural area, and their water came from a private well. After her diagnosis, the family could not afford bottled water for the whole family, so they gave bottled water to Miriam and the rest of the family relied on a new filter on their water.

In 1992, Miriam died. Her mother had quit work in the vineyards to care for her daughter during her battle with cancer. Three months after her daughter's death, Miriam's mother rejoined the workforce as a picker—reluctantly.

Luis, father of the McFarland cancer victim, John, works in an almond orchard. He believes that competition has forced growers to keep trying to improve their production through the use of more and different pesticides.

“There is no way they can get more quantity without the pesticides,” he says. “My boss asks me how my son is doing. We talked after my boy got sick. I told my boss if he put me spraying pesticides again, I would no longer work for him. He doesn't make me spray pesticides anymore.”

The parents' belief that agricultural chemicals caused the cancer clusters is not matched by any hope that something will be done.

"I don't believe that will ever happen," says one family member. "I believe the farmers are stronger than the government. The farmers are the ones who move everything in California. They are bigger than the government. And they want their chemicals." As for field workers, "we just don't count for much," says another parent of a cancer victim. Farmworkers feel as though their children are experimental rats. Yet, many field workers, even though they believe that pesticides are to blame for the cancers, are afraid to speak out for fear of offending the farmers and losing their jobs. "If you are seen as a troublemaker, then you show up the next day and your boss tells you your job is gone."

Agriculture

Spokesmen for the agricultural chemistry industry observe that their products have never been identified or linked with the clusters by any official source.

Commercial farmers say that, except in infrequent cases of accidental exposure, the rules for pesticide application and worker protection are closely monitored by federal and state officials. They argue that pesticides properly applied allow farmers to produce an abundance of food.

Yet even with regulation, records and studies indicate there are many cases of pesticide related illnesses. The California Department of Food and Agriculture reported more than 1,200 cases in California alone in 1986 based on worker compensation records. Nationwide, one estimate calculated as many as 313,000 pesticide-related illnesses among farm worker each year.

The tendency to lay the blame of the cancer clusters at the door of agriculture angers the farmers who grow food and buy and use chemicals in the southern San Joaquin Valley. They are frustrated. In the words of one, they constantly face people who say, "Kids are dying, so you must be killing them."

They stress that no scientist has linked the pesticides they use to the cancer clusters but that they still have been indicted in news stories on the subject.

"You are searching for answers," says Vido Fabbri, a 64-year-old farmer who lives on his own 3,000-acre farm in Kern County. "But you are searching the wrong place. We're poor dumb farmers. We're not scientists."

Fabbri lives amid the pesticides used on his fields of grapes, cotton, almonds, and vegetables. "I used to have the crop duster leave on the spray when he went over my house. I wanted to kill the spiders that gather in the windows. Now, they won't do that anymore.

They used to come right over my house and spray us all. We'd leave the windows and doors open. My wife loved it because it killed spiders," Fabbri says.

"We don't live out on the edge. We're surrounded. We're in that area—if you want to call it what environmentalists call it, the total toxic zone—and we're totally exposed. Here I am," says the 64-year-old. "Do I look sick? I've had no skin cancer. No operation. Nothing."

While agriculture in the valley is big business—with the average farm size running more than 1,000 acres in a county like Kern—it is still primarily a family business. Farmers note that they are legally using chemicals that they believe the scientific world has assured them are safe. They repeatedly point out that they and their own families are exposed to the same chemicals.

"My kids live in the middle of almond groves," says farmer Norm Bartell, who also grows cotton and grains in the Wasco area of Kern County, south of McFarland and Earlimart. His is the third generation of Bartells on the 1,600-acre farm. "Kids in town have a half-mile buffer zone from spraying. My kids have less than 50 feet. If you got the guts to tell me I would put money before my kids, you can pretty much go to hell."

Bartell and others worry that agriculture will lose the tools it needs to provide good quality cheap food for the nation. He particularly gets annoyed at urban environmentalists. "People who drive an hour and a half to work and another hour and a half back each day want to take the moral high ground and say we should not use the chemicals," he says.

"People have a natural tendency to seek somebody to blame when tragedy strikes a family. By the way, my dad died of cancer, and we didn't blame it on pesticides. Lymphoma at age 57," Bartell says. "I don't blame it on pesticides, and he was my father."

Mona and Peter Pankey live on a 480-acre farm in southern Kern County, growing everything from apples to grapes. "When you live in the environment you are working in, you wouldn't want to do anything to hurt your own family," says Mona Pankey. "People want a perfectly safe life, but they don't want to give up a perfect life. They want technology, automobiles, perfect food, but they want it risk-free." Peter Pankey, who grew up farming in Orange County, bought the farm 15 years ago. The Pankeys believe that pesticides do pose some type of risk but that it is minute compared to the hazards posed by everything from automobile emissions to high-salt diets.

Bill Tracy, deputy director of the California Department of Food and Agriculture, is from a family of longtime cattle and cotton farmers in the western Kern County community of Buttonwillow. Tracy has signed state documents pulling pesticides off the market when health problems were found. He does not believe that pesticides are causing the cancer clusters.

“I feel for these people,” Tracy says. “I lost a 6-year-old nephew to leukemia, and there is nothing worse than seeing a four-foot coffin lowered into the ground. If we thought it was any of our pesticides or practices, we would have changed them. But it was a tragedy, a tragedy just like when a child dies from leukemia in the city.”

Farm Workers Unions and their Advocates

Farm worker unions insist the problem of pesticide-related illnesses in farm workers is massive. “About a third of pesticides being used are carcinogens, cancer-causing substances,” says Dr. Marion Moses, a San Francisco physician active with farm worker groups and a member of the pesticide advisory committee of the Environmental Protection Agency. According to Dr. Moses, cancer deaths are directly correlated with the amount of pesticide used in any given county in California.

In 1984, after the discovery of the cancer cluster in McFarland, United Farm Workers, led by Cesar Chavez, began a boycott of table grapes seeking a ban on five chemicals used on the crop: phosdrin, captan, dinoseb, methyl bromide, and parathion. Those chemicals, the union said, were responsible for numerous birth defects among farm worker children in California and cancer among children of farm workers in Earlimart and McFarland.

State Investigations

In 1984, concerned citizen groups from McFarland asked Kern County officials to look into the cancer cluster in their community. Residents were concerned that the cancers were environmentally caused. They expressed concern, not only about pesticide application, but about the high levels of nitrates found in drinking water. In addition, rumors were circulating about a variety of other potential environmental hazards that might be causing the disease, including stored chemicals, pesticide sumps, abandoned gas stations, and electromagnetic waves. Within a year, the California Department of Health Services (DHS) took over the investigation and began monitoring the incidence of cancer in the area and testing for environmental health hazards.

For five years, DHS investigated the cancer cluster and searched for an environmental cause in McFarland. They tested the air, water, and dirt from backyards and school playgrounds. They measured electromagnetic waves from transmitters. They interviewed victims' parents and searched their homes for potential cancer suspects. They also studied and dismissed as unrelated four pesticides used heavily in the region. DHS used the following criteria to evaluate chemical and environmental carcinogens in the McFarland environment:

- (1) Is there a plausible scenario linking the cancer cluster to exposure to human carcinogens?
- (2) Do environmental levels suggest an elevated cancer risk?

(3) Are environmental levels in McFarland higher than in other areas?

The results of DHS's study included the following findings:

- Although relatively high rates of infant deaths occurred in 1982 and 1983 and there were high rates of fetal deaths and low birth rates for 1981-1983, rates for these three outcomes during the state's suspected period of common exposure for the cancer cases (1980 and 1981) were not significantly different from rates during the remainder of the study period (1975 to 1985).
- Comparing families of cancer victims with families of "controls" who did not have cancer, DHS initially found that 80% of the fathers of cancer cases, compared with 45% of the fathers of controls, worked in the fields in the time interval between three months before pregnancy and the date of diagnosis of the child's cancer. A further investigation, however, revealed previous classification errors. DHS concluded that the difference between the two groups was not statistically significant.
- Comparing families of cancer victims with families of controls, more victims, as well as families of victims, reported exposure to aerial spraying of pesticides or herbicides. However, the state concluded that this difference was probably due to a difference in reporting rather than a difference in control since both victims and controls lived close to fields where pesticides were applied.
- Although there were high concentrations of nitrates in the drinking water, the state did not find high concentrations of nitrates in 1980 to 1981, the period they suspected that any deleterious exposure occurred. Moreover, the state also concluded that nitrates are not carcinogenic even though nitrate related compounds (nitrosamine) are carcinogenic.
- DHS did not find any new use pesticides or increased use of unusual pesticides during the suspected period of common exposure. Since there were no records of air monitoring for pesticides for that time period, DHS had to rely on farmer reports of pesticide application.
- DHS evaluated 55 pesticides reported used near McFarland from 1979 to 1983. Thirteen of those were identified by the Environmental Protection Agency (EPA) as potential carcinogens. Four additional pesticides were classified by EPA as probably carcinogens. Carcinogenic effects exist in a number of the identified pesticides that were not formally classified as such by EPA.
- In 1990, 60 pesticides were reported used within 1-2 miles of McFarland. Thirteen of these were classified as potential carcinogens and three were classified as probably carcinogens.
- DHS identified four pesticides that were applied in greater quantity during the period of

common exposure but failed to find that these four pesticides contributed to the childhood cancers based upon their toxicological data.

- No unusual levels of pesticides were found in McFarland's air based upon limited air monitoring data that was available.
- DHS found contamination from DBCP, a pesticide, in the drinking water of McFarland. However, DHS concluded that the low level of contamination was common to other California agricultural areas and did not suggest any unusual risk associated with McFarland's drinking water.
- DHS found some localized soil contamination by chemicals such as arsenic but concluded that the contamination was not widespread enough to explain the cancer clusters
- DHS concluded that electromagnetic fields from a Voice of America radio transmitter four miles north of McFarland could not have caused the cancer cluster because the measurements of these fields were below existing standards.
- DHS checked the general health of McFarland's children, theorizing that if something was causing cancer, it might also cause an increase in other diseases. The study revealed that McFarland's families have difficulties obtaining needed health care, while children suffer from a variety of health ailments -- 17% needed follow-up medical treatment; 24% had anemia, a possible indicator of malnutrition; 40% had vision problems; and 36% needed dental care. DHS, however, found no environmental cause for these problems.

State officials have not been able to make a link between the cancers and pesticide exposure. "I think it is a plausible thing for which there is not sufficient evidence at the state level to answer," said Dr. Rick Kreutzer, a physician and state epidemiologist who has worked on the McFarland investigation for a number of years.

In December 1989, after five years and \$50,000 of investigation, despite strong objections from residents of Earlimart and McFarland, state health officials announced that they were suspending their study of the cancer cluster in McFarland and that it planned no detailed research into the second cluster discovered in the nearby town of Earlimart. Dr. Rick Kreutzer, who headed the McFarland study, said no new research was planned until the state determined whether high cancer rates afflict other areas of the four counties making up the southern San Joaquin Valley—Kern, Kings, Fresno, and Tulare. Kreutzer said the concerns raised in McFarland and Earlimart, in particular, about a possible link to pesticides cannot be answered without looking at the entire region. "The small numbers [of cases in the two towns] make it very hard for us in a statistical way to make a statement about agricultural exposure," he said.

In May 1990, a study from the health department revealed that they could not identify any communities with childhood cancer clusters similar to Earlimart and McFarland. In fact, the study

showed that children in San Joaquin's urban areas had higher cancer rates than those in its rural agricultural areas—a finding that seems to challenge the widespread suspicion that the McFarland cancer cluster is related to agricultural chemicals. Of course, there were severe limitations to the study. The investigators had no information on children's exposure to possible carcinogens, nor did they know parents' occupations, whether children had lived elsewhere before diagnosis, and whether other children became ill after moving away.

In 1991, the state concluded that childhood cancer rates across the four counties during 1980-88 were not substantially different from the rates which would be expected based on general population rates. Even though there were a small number of communities, including McFarland, with significantly more childhood cancers, there were some with significantly fewer cases than expected. The state could not distinguish whether the excess at the “high rate” communities was caused by chance or by environmental exposure. Neither could they identify any factors among the communities with “high rates” which might explain the excesses.

In 1991, after what may be the longest cancer cluster investigation ever conducted, the state scientists gave up. Nothing they had unearthed could explain the cancer; a panel of independent experts who guided the work concluded that enough had been done on the investigation. Rather than recommending further study of the cancer clusters, the McFarland Scientific Advisory Committee recommended additional medical outreach for children's health in the community as a higher priority. It also made the recommendation that DHS pursue further the general issue of pesticide-related risks for cancer among California children. Studies of larger populations than McFarland might better detect risks which may exist. The state decided not to investigate the cancer cluster at Earlimart.

“We did not find a specific cause, but we did not disprove anything either,” said Dr. Richard Kreutzer, a lead state investigator on the cluster. “I'm afraid that is the limit of science. We just can't say with assurance whether something was going on, or whether McFarland had a clump of these cases just by chance.”

In the world of cancer cluster research, that uncertain conclusion is common. Success in pinpointing a cause typically comes only in clusters where exposure is measurable and the cancers are the same kind. “Our batting average has been very poor in explaining these clusters, and we know that no matter how much we try to show the public what we're up against, hope springs eternal,” said Dr. Raymond Neutra of the state Health Department. He likens residents of cancer cluster towns to “the wife of a man who is lost at sea. The searchers send out the helicopters, and after several days, they know there is no hope. But the wife insists the search must go on. When it ends, she feels betrayed.”

The residents of McFarland and Earlimart feel the same way. They feel “abandoned” by the government. “We have this cloud over us, and we were hoping that an explanation would come out to chase it away,” says one resident. “When they couldn't give us anything, it left the community scared.” Another resident, a mother, says she is on edge constantly. Like many of

her neighbors, she watches her three children “for any sign of sickness.” Like many others, she feels powerless to protect her family.

Although their instinct is to flee an environment they view as perilous, many residents of cancer cluster towns are trapped by economics. Some say they cannot sell their homes because of their communities' notoriety; others are tethered by jobs. “I look at the mountains and I think maybe there is a clean place where my family would be safe. But my work is here. I have no money to move.”

Another resident, a store owner, says he is not too worried about his health, but is concerned about his future. “Since the cancer came, my business has gone straight downhill.” McFarland has “a stigma attached to it now,” he says, and “people just stay away.” The main grocery store went under and a few smaller stores have closed.

DHS has continued to monitor the occurrence of cancer in McFarland children. Since 1990, seven new cases have occurred, three more than one would expect. Unfortunately, the Department of Health Services has determined that the new cases of cancer are unlikely to help determine a cause. As of September 1996, DHS was not planning any further environmental health study in McFarland. However, the department has received federal funds to study the relationship between childhood cancer and environmental factors, including pesticides.

In late 1996, responding to a petition from some McFarland residents and a non-profit organization, the United States Environmental Protection Agency announced that they would conduct studies of air, soil, and water in McFarland to determine if regulatory standards are being violated. These studies are designed to evaluate current exposures but are not designed to explain the prior occurrence of excess cancer cases. EPA will examine leaking underground storage tanks and check for possible levels of pesticides, insecticides, and compounds in drinking water and possible dumping sites.

The community of McFarland is once again split over the new EPA study, as the following August 1997 article in the *Los Angeles Times* relates:

McFarland has seen 21 of its children stricken with cancer since 1975—more than three times the expected number for a community of 8,000. Surely, it was some chemical lurking in the fields, residents reasoned. McFarland wasn't called the “Heartbeat of Agriculture” for nothing.

So when science failed to pinpoint a culprit—some experts guessed it was pesticides in the drinking water and others chalked it up to a statistical snag—it left this San Joaquin Valley town in a peculiar limbo, neither damned nor vindicated. Part of McFarland is grateful that it dodged a verdict. Part of McFarland, especially the farm workers whose children became sick or died, feels cheated.

Now a new team of investigators, this one from the U.S. Environmental Protection Agency, has converged on the poor, mostly Latino town with a promise to test the water, air and soil in a more definitive way and determine once and for all if McFarland is safe.

The study is a year from completion, but already it has brought back bitter feelings, setting a hard line between those wanting to put the “cancer cluster” behind them for the sake of economic development and those pressing the EPA to do all it can to find a cause, no matter the cost to the town's renewal.

“We're a community stuck on hold,” said Betty Fain, a longtime resident who applauds the new study but fears that it will only end in the same enigma.

“You get angry but you don't know where to direct your anger. You want someone or something to blame but there's no one or nothing to point a finger at. I hope these new tests come up with something, but if they don't we're going to have to accept that.”

Like most of the town's movers and shakers, City Manager Gary Johnson works hard to punctuate the positive. His tour of McFarland takes in the housing tracts and privately run prison under construction, the new McDonald's that took no shortage of courting, and the baseball diamond where every bounce off the genuine clay is a true one. He manages to bypass one landmark: the neighborhood of stucco houses where the first cancers were discovered.

“It's seven people who are moaning and griping and making the EPA come in,” said Johnson, who also owns the local hardware store. “We've got 8,000 other residents who prefer that the feds leave town. I have a daughter who is 8 and was born in the middle of this and I would have left town if I thought there was a danger.”

A place this small normally doesn't boast an east and west side, but California 99 slices McFarland right in two—its main street full of dead and dwindling businesses, its Pentecostal churches and fruitless mulberry trees, its lush fields of grapes, walnuts, kiwis, almonds and cotton.

One reason McFarland ranks among the 10 poorest cities in the state (an annual per capita income of \$ 6,056) is that very little of the farm bounty passes through the local economy. Much of the land is in the hands of growers who live and trade elsewhere. There are no tractor or spray-rig companies in town, no stores selling seed.

Rather, this is a community of second-generation farm workers, many of

whom followed their parents into the fields or moved to clerical jobs or welfare. The population is 94% Latino, and downtown has a south-of-the-border feel, with its El Cha Cha Cha bar and beauty salon advertising \$ 6 cortes de pelo (haircuts).

City leaders tend to blame the economic woes on the cancer cluster, and certainly the enduring stigma and media spotlight haven't helped. But years before Jesse Jackson, Cesar Chavez and various Kennedys marched through town chanting the ills of chemical agriculture, McFarland began to bleed.

Many of the Dust Bowl refugees who built and propped up a thriving downtown passed away in the 1960s and '70s, and their children moved to the big city. A lot of Main Street went with them.

“Schneider's Drug Store, Ruth's Dress Shop, Diffy's Hotel, Home Cafe, Safeway Market—they're all gone,” said Fain. “So is the theater, the feed and seed store, the Dairy Delight where we held street dances at night. One by one over years. And it had nothing to do with the cancers.”

The cancers came to the public's attention in 1984 after Connie Rosales was told that her teenage son had lymphoma. She began comparing notes with other mothers in her neighborhood and alerted county health officials to the stunning news: On her tiny block alone, five children were stricken with cancer. From 1984 to 1992, nine more children—toddlers and a teenage football star—were added to the list.

Of the 14 cases, half ended in death. Mario Bravo died of liver cancer. Tresa Buentello succumbed to cancer of the adrenal gland. Frankie Gonzalez lost a leg to bone cancer, and then lost his life.

The chances of so many childhood cancers concentrated in such a small place ranged from 1 in 100 to 1 in 1,000—a so-called “cancer cluster,” experts determined. County and state investigators began collecting water samples from houses and municipal wells and tested for about 100 chemicals. They scraped soil samples from parks, playgrounds, yards. They even measured radio waves from a Voice of America transmitter at the edge of town. Nothing conclusive turned up.

Some of the best epidemiologist in the country were called in as advisors. The task force widened the net to compare childhood cancers in four farm counties in the San Joaquin Valley. Again, no pattern was found.

If the culprit was an agricultural contaminant, why were the children suffering from so many different kinds of cancer—liver, lymph node, blood, bone,

eye, adrenal, kidney? And what about the other kids suffering weight and hair loss and a variety of other inexplicable ailments?

These were questions that government and university scientists and health officials could never answer. The investigation ended in 1992 with some scientists leaning toward a farm chemical and others concluding that it was a “random aggregation,” something akin to flipping a coin and landing heads a dozen times straight.

The inability of science to pinpoint a cause ripped the town into angry factions. Some families accused health officials of yielding to pressure from the big farm interests and conducting a halfhearted probe. Others accused Cesar Chavez of exploiting the cancer victims to publicize pesticide dangers and raise funds for his struggling United Farm Workers union.

“How could the experts call it a complete investigation when they never took deep core samples of the soil or tested the air?” asked Marta Salinas, a farm worker who left McFarland in 1991 out of concern for her children's health. “We found that some of the houses were built near an old shed where they used dangerous chemicals to ship potatoes.”

The investigators went away but after a brief lull the cancers came back: The disease has been diagnosed in seven more children since 1992. One mother, Rosemary Esparza, watched her son, Adrian, survive eye muscle cancer a decade ago and go on to college only to learn that her 13-year-old daughter, Raquel, now has ovarian cancer.

After learning of the new cases, Salinas and a handful of residents petitioned the EPA. The federal agency looked over the previous task force study, found it lacking in spots and agreed to conduct a more thorough inquiry.

The test kits and questions have returned to this town, and that doesn't please local business and civic leaders, many of whom never thought there was a problem in the first place. The federal team—and the reporters who invariably follow—are coming at the most inopportune time, they say. After years of operating in the red, the town is finally tasting the fruits of revival.

“We're just beginning to wipe away the stain,” said Russell Coker, a local contractor who has two young healthy children. He said he knew the town had turned a public relations corner when his fellow contractors down the road in Bakersfield stopped kidding him about his cooler filled with McFarland water. “Now all this is back in the news and we're a town with a stigma again.”

For City Manager Johnson, a Kern County native who carries a tinge of his family's Tennessee background in his voice, McFarland's growth gets personal. Every year, when the state comes out with its new population figures, Johnson drives out to the local highway sign and adds a few more numbers to the grand total.

“We're 8,013,” he says, munching on a bag of Japanese party mix while driving a visitor around town. Stop one was the McDonald's. Johnson said the area franchise holder didn't think McFarland could sustain the restaurant, so he had to persuade the corporation to invest. “We did so well the first year that the franchiser decided to exercise his option. Once McDonald's came, Chevron was willing to locate across the street.”

Johnson drove past the gleaming new middle school built with a \$ 9.2-million local bond, and then the high school. “Our biggest claim to fame isn't the cancer cluster but our cross-country team, coached by Jim White. We've won five state championships in a row. It's unheard of.”

When asked how it was done, Johnson answered with a straight face. “The water. They tank up before every meet. That and beans.”

On an old almond orchard, the Wackenhut Corp. out of New York was putting the finishing touches on one of its chain of private prisons, this one for minimum-security parole violators. “That's 240 jobs and 1,000 inmates,” he said. “And we're going to claim all of them as residents.”

He pulled up to La Jolla Estates, one of two housing tracts under construction, and chatted with Bakersfield builder Earl Leach. He introduced his passenger as one of those newspaper reporters.

Leach lit up. “The last time the government came, they asked me to stop building for a few months and it was a five-year moratorium. All for a cluster that was an imaginary thing.”

Leach said no government scientist was going to cause him to lose faith in McFarland, and he was putting his money to match his mouth—on 37 new houses, all rentals. “I'm 76 years old. These rentals work while you sleep.”

Salinas said the focus on commerce was regrettable. “All I hear is that this study is bad for business. They seem to think that a McDonald's is more important than a child's life.”

A few weeks ago, the EPA team began collecting water samples from the

municipal well. Once the water is analyzed for more than 300 chemicals, the air and soil will be tested. Neither side is likely to be pleased. The study won't reconstruct the past. It will only measure what's in the environment today.

“We're not trying to figure out the cause of cancers in the 1980s,” said Elizabeth Adams, the EPA official in San Francisco who is overseeing the study. “We're trying to figure out if McFarland is safe today.”

Communication with the Community

In a hearing before the Senate Toxics and Public Safety Management Committee in July 1985, some residents of McFarland criticized the California Department of Public Health (DPH) for not keeping the community well enough informed of its studies and the results of those studies. In response to these concerns, DPH made a conscious effort to improve communications. Starting on the next page, you will find several newsletters and fact sheets that the California Department of Health Services used to help communicate with the community and bring people up to date on the department's work and findings from October 1988 through May 1996.

In reviewing these newsletters and fact sheets, ask yourself how satisfied you would be with the information if you were a member of the community? What else would you like to know? Could the information be presented in a more useful fashion?

Questions for Thought

*1. Many members of the McFarland community, especially families of the cancer victims, have long been convinced that pesticide exposure has been the cause of the cancers at McFarland and Earlimart. And some of the findings of the California Department of Health Services (DHS) are consistent with this hypothesis. DHS, for example, found that the childhood cancer rate in McFarland is abnormally high. DHS also found that many residents of McFarland were exposed to pesticides and herbicides that are known to cause cancer in laboratory animals or that are suspected carcinogens for other reasons. There are also epidemiological studies that indicate that agricultural workers exposed to herbicides and pesticides have a higher incidence of lymphoma, leukemia, and soft tissue sarcoma, many of the cancers found in the McFarland victims. Is this enough information to conclude that pesticide exposure caused the cancers? Should use of any particular pesticides be banned based on this information? If so, what pesticides? If you do not believe that this information is sufficient to ban the use of any pesticides, what additional information do you believe the government should have before imposing a ban?

2. Epidemiologists typically require a relatively high level of statistical significance (e.g., 95% certainty) before they are willing to attribute a particular illness to a particular cause. What level of statistical significance should DHS require before concluding that the cancer cluster in

McFarland is the result of pesticide exposure? If DHS, based on its studies, concluded that there is a 50 percent probability that exposure to particular pesticides led to the cancer cluster, should DHS take action against the pesticide(s)? What if DHS concluded that there was only a 20 percent probability? a 5 percent probability?

Consider in this regard the following excerpt from Professor Phil Brown's earlier quoted article on Woburn, Massachusetts:

Activists view scientists as too concerned with perfection in scientific study. Residents believe that there have been visible health effects, clear evidence of contamination, and strong indications that these two are related. From their point of view, the officials and scientists are hindering a proper study, or are hiding incriminating knowledge.

The level of statistical significance required for intervention is a frequent source of contention. Many communities that wish to document hazards and disease are stymied by insufficient numbers of cases to achieve statistical significance. Some professionals who work with community groups adhere to accepted significance levels, while others argue that such levels are as inappropriate to environmental risk as to other issues of public health, such as bomb threats and epidemics.

Epidemiologists prefer false negatives to false positives—i.e., they would prefer to claim falsely that an association between variables does not exist when it does than to claim an association when there is none. This burden of proof usually exceeds the level required to argue for intervention. Beverly Paigen, who worked with laypeople in Love Canal, [by contrast] believes that standards of evidence are value-laden:

Before Love Canal, I also needed a 95 percent certainty before I was convinced of a result. But seeing this rigorously applied in a situation where the consequences of an error meant that pregnancies were resulting in miscarriages, stillbirths, and children with medical problems, I realized I was making a value judgment ... whether to make errors on the side of protecting human health or on the side of conserving state resources.

*3. Re-read the article on communicating technical information by Professors Johnson, Sandman, & Miller in the introduction to this section. Then answer the following questions regarding the informational newsletters and fact sheets that DHS distributed to the residents of McFarland.

(A) For what reasons or purposes, should DHS provide information regarding its

investigation to the community?

(B) How effective are the newsletters and fact sheets in achieving these reasons or purposes?

(C) How, if at all, do you believe the newsletters and fact sheets could have been improved? Was the level of detail appropriate?

(D) Are newsletters and fact sheets the most effective means of communicating with the community? If not, what would be better approaches, and why?

(E) How, if at all, do you believe the newsletters and fact sheets affected the residents' perception of the potential risk of living in McFarland? of DHS's investigation? If you believe the perceptions changed, do you believe the change was for the better or worse? Why?

4. DHS formed a Scientific Advisory Committee to help advise them in the investigation. Should representatives of the community be included as members of the advisory committee? Should the community have a role in deciding the direction of the investigation? If so, what should be the role?

*5. As noted in the case study, the McFarland Scientific Advisory Committee in 1991 did not recommend further study of the cancer cluster, but instead recommended additional medical outreach for children's health in the community. If you had been a member of the McFarland Scientific Advisory Committee in 1991, what would you have recommended that the government do? If you had been advising community residents, what would you have recommended the community request the government to do?

Given the difficulties in using epidemiological studies to determine the cause of a cancer cluster, should the community ever have staked much hope on DHS's investigation? Should DHS have devoted the immense resources that it did on its efforts to find an environmental cause of the McFarland cancer cluster? Is there a better way to use existing resources to improve the health and safety of farmworkers and their families? Should DHS have communicated to the community earlier the difficulties involved in trying to find the cause of a cancer cluster?

6. As a number of the earlier readings point out, there is always the possibility that a cancer cluster is the result of either statistical chance or the demographics of the particular community, rather than of any particular environmental contaminant unique to the community. Once a cancer cluster is found in a community, do you believe that there is any way of convincing the community that the cluster is not the result of some external cause (like pesticide exposure or toxic air emissions)? If you believe that a community can be convinced, what type of evidence would it take? Explain.

7. What strategies might a local community like McFarland use to address a cancer cluster? to address pesticide overexposure issues? What goals and strategies should environmental justice organizations have in a town like McFarland?

Cesar Chavez went on a hunger strike partly as a result of the McFarland's cancer cluster and started a campaign to urge growers to stop the use of four pesticides which he believed cause cancer and birth defects. As part of that effort, the United Farm Workers started a grape boycott which is still ongoing to force growers to agree to their demand. The hunger strike brought national attention to the McFarland problem and brought then presidential candidate Jesse Jackson and other celebrities to McFarland. Is the United Farm Workers' strategy useful to the nationwide environmental justice movement? to the community of McFarland? Explain.

Case Study Exhibits

Exhibit A: McFarland Community Health Newsletter

Exhibit B: Fact Sheet, Questions and Answers about the
McFarland Health Screening

