Risk Analysis, Vol. 6, No. 1, 1986

EDB: A Case Study in Communicating Risk

[1]**Harold Issadore Sharlin**

Received February 10, 1985; revised May 9, 1985

This is a report on the Environmental Protection Agency's (EPA's) efforts to communicate with the public about the risks of ethylene dibromide (EDB), what the agency said it was doing about these risks and what information the public actually received through television and newspapers. Although special in many ways, the EDB case illustrates the problems that regulatory agencies have when they must take regulatory action and assure the public that the risks in question are being dealt with adequately. It also illustrates issues that the press faces. Above all, it illustrates the barriers to communication presented by the different perspectives of regulatory agencies and individuals and the types of information they each are most interested in.

KEY WORDS: Regulating carcinogens; macrorisk and microrisk assessment; media content analysis.

1. INTRODUCTION

In the short space of 6 months, during 1983–1984, the American public was faced with fastbreaking stories about the threat to public health from a widely used, effective pesticide—ethylene dibromide (EDB). News stories reported that EDB was a potent carcinogen and that residue of EDB was being found in packaged foods on supermarket shelves. A tidal wave of public anxiety swept the country. The public wanted specific, easily understood information about the risk and assurance that timely action was being taken to eliminate the threat.

This paper is a summary of a report on the Environmental Protection Agency's (EPA's) efforts to communicate with the public about the risks of EDB, what the agency said it was doing about these risks, and what information the public actually received through the press and television.[1] The EDB case illustrates the problems regulatory agencies encounter when they must take regulatory actions and assure the public that the risks in question are being dealt with adequately. It also illustrates the barriers to communication presented by the different perspectives of regulatory agencies and individuals and the types of information they each are often most interested in sending and receiving.

The specific question for this study was: "What was EPA trying to tell the public about the risk issues in the EDB case, and what information did the public actually receive about these risks?" The study covers the period from September 1983 to April 1984, during that time public anxiety reached a peak and rapidly dissipated.

Two terms, macrorisk and microrisk, will be used throughout this article. One term, macrorisk, represents EPA's technical assessment of the threat that EDB posed to the public health. Microrisk, on the other hand, is the individual citizen's means of answering the unexpressed question: "What does that mean to me, personally?"

2. EDB IN GROUNDWATER

On September 30, 1983, the EPA announced that it had ordered an immediate emergency suspension of EDB as a soil fumigant for agricultural crops

[1]2832 Northampton Street, NW, Washington, D.C. 20015-1110.

0272-4332/86/0300-0061$05.00/1

and a cancellation proceeding against all other pesticide uses of EDB. The reason for taking this action, the Agency explained, was that EDB had contaminated groundwater in several states and had been shown to be a carcinogen and mutagen in test animals. The EPA news release went on to explain that a suspension was the most restrictive measure that the Agency could take against the use of the pesticide under the law and that the action would immediately halt the sale and distribution of EDB as a soil fumigant, which represented 90% of the pesticide use of EDB.

The second part of the announced regulatory action, the cancellation proceeding, was intended to end all other major uses of EDB as a fumigant for stored grain, for spot fumigation, and for use in flour milling machinery. Because of EPA's concern that EDB contaminated the food supply, the Agency was going to collect data to obtain a better understanding of the risk to the public. The EPA action was also intended to phase out the uses of EDB as a fumigant for citrus and tropical fruits. This phase out was to be completed by September 1984.

2.1. The EPA Message

EPA said that the primary objective of the September 30, 1983 news release was to explain to the public that EPA was taking forthright action to manage the risk from EDB. The Agency did not have sufficient information to take emergency action against EDB as a grain fumigant, but there was serious concern in September by the Agency and by the public about contamination of groundwater and, therefore, the immediate and swift action was justified. The public was also informed through this news release that the first steps to eliminate the dietary risk from fumigating grains were taken.

The sense that the Agency tried to convey through action and through public information was that there was cause for concern about EDB but not for alarm; the Agency was moving quickly and in an orderly fashion to bring the situation under control. The macrorisks were serious, but EPA tried to convey a sense that the risk was chronic or long-range in nature and that there was no cause for alarm. No change in eating habits was called for. The Agency's actions, as explained in the press release, were managing the macrorisk problem, but what of the microrisk problem? As one EPA professional said, "the information conveyed by the Agency did not answer the public's question: What does EDB exposure mean to me, the average American?"

For the moment, EPA turned its attention to the immediate national problem of EDB's invasion into the groundwater. But for the reporters from the press, the suggestion that EDB was in the food supply, affecting the very bread people were eating, gave the reporters the local angle that they needed for their newspapers. As one EPA public information specialist described it, there was an absolute frenzy, after the September 30 announcement, of reporters trying to obtain copies of press releases. They lined the halls of EPA scrambling for copies of the technical Position Document #4 of which 400 to 500 copies were distributed to reporters. What message would these reporters transmit to the public?

2.2. Transmitting the Message

2.2.1. Television

The major impact that the television medium had on the public microrisk perception was in the creation of dramatic images. During the course of regular 7:00 news programs and in news specials, several images were conveyed repeatedly about the risk from EDB. One sequence seen on all the major networks showed two workers who had come into direct contact with liquid EDB and were being washed down with a hose in a futile attempt to detoxify them. The next scene showed an ambulance in the distance rushing the workers to the hospital where, the viewing audience was told, they died soon after.

Another repeated sequence shown was a close-up of a grain elevator worker who had been exposed to EDB over a 30-year period and had succumbed to a terrible, debilitating nervous disorder. Both of the images, the siren-sounding ambulance and the grim picture of a man who could not control his erratic movements, conveyed a microrisk aspect of EDB. *Individuals* were harmed. The obvious message being conveyed was that EDB was toxic and, therefore, an immediate danger to individuals, whereas, the message that EPA conveyed was the EDB was in the food supply and was a chronic or long-range risk problem. The news stories on television missed the point and mistranslated the macrorisk assessment.

The television images often lacked subtlety. One network displayed a background of a skull and

cross-bones every time a reporter discussed the latest news about EDB.

2.2.2. *Newspapers*

The Twentieth Century Fund Report, *Science in the Streets*, states that news is not education but information, "... it provides acquaintance with, not knowledge about dramatic events." The Report continues by saying that economic, social, and political influences converge on journalists to shape the definition of what is news.[2] How was the information that was released by EPA interpreted by the press?

2.2.2.1. National Press. If the hypothesis of this study holds true, that there is a macrorisk as well as a microrisk perspective; how would that effect newspaper treatment of the EDB risk issue? Did the national press, such as, *The New York Times*, *The Wall Street Journal*, and *The Washington Post* treat questions about EDB differently from the local press? If so, what was the difference?

In September and October 1983, *The New York Times* coverage was of aggregates. The paper reported, among other things, that approximately 100,000 residents in Florida were affected by EDB groundwater contamination and that 53 companies manufactured EDB. In one article, *The Times* referred to the "emergency suspension" of EDB as a soil fumigant and noted that this was only the second time EPA had taken the emergency suspension action.

The Times was consistently more accurate and detailed than local newspapers on technical questions, which was to be expected, since major newspapers, like *The Times*, have specialized staffs of science writers, as well as better access to expert information than do small local papers.[2]

The national perspective can be seen in viewing EPA and Occupational Safety and Health Administration (OSHA) as part of the national government so that their actions were seen as related to each other and as part of national policy. *The Times* frequently linked OSHA and EPA in the same article. Although OSHA's actions and EPA's actions do overlap, they do, indeed, affect different publics, and in the local press the two agencies are usually dealt with separately.

So the perspective of *The Times* as a national newspaper was very much the same as that of EPA. That perspective as expressed in the newspaper's articles is at the macrorisk level. When 100,000 Florida residents are affected, that is news for *The Times*, but the threat to the individual in terms of microrisk is rarely news to a national newspaper.

The Wall Street Journal also had a national perspective and combined coverage of EPA's actions with those of OSHA. The technical competence, particularly in this regulatory area, of *The Wall Street Journal* was somewhat lower than that of *The New York Times*, as evident from *The Times* specific treatment of laboratory tests and *The Journal's* more general reference to "recent scientific evidence."

The Washington Post, although it can be considered a national newspaper, has a more narrowly parochial approach than *The Times* or *The Wall Street Journal*. One *Washington Post* story in September 1983 dealt knowledgably with the technical aspects of EDB risk from the macrorisk point of view. At the end of the article, the microrisk issue was raised when someone at the National Institute for Occupational Safety and Health (NIOSH) was asked by the reporter what the safe level of EDB in food and water was. The answer by the NIOSH scientist was, "I'm a consumer, too. I eat all those things. And I don't know how to answer that question."

Time Magazine, in an October 1983 feature article about EDB, flippantly referred to EDB as "the chemical of the month," saying that EDB along with other "once obscure substances, such as dioxin and PCB," was suddenly catapulted into the public spotlight. The article dealt more with the politics of regulatory action in Washington and deprecated the macrorisk aspect and seemed to belittle the microrisk view.

2.2.2.2. Local Press. For most newspapers in the United States, outside of the national press, reporters must translate EPA information into something newsworthy and find some handle that is local in interest. News articles in *The Miami Herald*, *Honolulu Star-Bulletin*, *The Honolulu Advertiser*, *The Dallas Morning News*, *The Arkansas Gazette*, and *The Arizona Republic* reflect a limited state-wide perspective.

The Honolulu Star-Bulletin and *The Honolulu Advertiser* carried a number of articles, during the early EDB regulatory action, emphasizing concern that the regulatory action might adversely affect Hawaii's fruit growers. They gave some space in mid-September 1983 to the so-called 7-year EPA delay in dealing with EDB. But, as time went on, the newspapers minimized the EDB risk and, in the first part of October, the report was that the amount of EDB in Hawaiian wells was only 0.09 parts per

billion (ppb) compared to Florida where the EDB level in some wells was 800 ppb. "

Just prior to the September 30 EPA announcement, *The Star-Bulletin* and *The Advertiser* reflected the growing anxiety in Hawaii about the possible effect of an EDB suspension. Banning EDB, the newspapers reported, was "a life–death matter" for tropical fruit growers.

The EDB threat to the public health in Hawaii was minimized in the local press, and any severe restrictions on the usage of the pesticide was considered unnecessary as well as disastrous to the economy of Hawaii. *The Star Bulletin* and *The Advertiser* reported views as expressed by tropical fruit growers and the governor against a background of centralized decision making in Washington. The Hawaiian papers' reporting typified the local view taken by most newspapers in the country.

There was a sharp contrast between local newspapers and national television news on EDB in groundwater. National televised news about Hawaii showed viewers the beautiful lush Hawaiian forests and sparkling brooks with an announcer's voice-over saying, ominously, that EDB was poisoning this paradise. The local view expressed in the newspapers was quite different. The argument was that, indeed, Hawaii is different from the rest of the United States and, if there was going to be a ban on EDB, it ought not apply to Hawaii.

The (Little Rock) *Arkansas Gazette* and (Phoenix) *Arizona Republic* took up the EDB story from the point of view of the consumers. *The Gazette* came out with its story on September 1, before the EPA soil fumigant announcement, because the paper was interested in the detection of EDB, "a potent cancer causing agent" in subsurface water samples. *The Arizona Republic* quoted the 1977 National Cancer Institute report on the "Unprecedented high risk of cancer" from EDB.

Both *The Arizona Republic* and *Arkansas Gazette* used local sources of information to obtain the local perspective and to be independent of centralized Washington-based information. *The Republic*, for example, used the University of Arizona Council on Environmental Studies, the state Agricultural Economist, and the Arizona Department of Health Services Ambient Quality Bureau. *The Gazette* used the Arkansas Pollution Control Ecology Department, state Health Department, and an enterprising reporter contacted the president of the Great Lakes Chemical Company, one of the manufacturers of EDB.

The Dallas Morning News and *The Miami Herald* wrote the stories from the dual perspective of consumers and citrus farmers. *The Morning News* reported that public pressure was mounting to do something about EDB in its October 1, 1983 story, but tempered their report by describing EDB as a "suspected carcinogen" that was used on Texas citrus fruit. The paper's sources of information included both an environmentalist group and the Texas Citrus Mutual Organization.

The Miami Herald began its coverage of EDB with two stories on October 1 and 3, 1983. The consumer perspective consisted of a complaint about the slow manner in which the EDB issue was being handled. That view was tempered also. Although EDB causes cancer in animals, there were no known human cancer cases that would demonstrate a health hazard in Florida. Farmers were not worried. They neither believed that a chemical that had been used for two decades was harmful nor that there was serious danger from EDB "if it is used carefully." *The Herald* used as its sources the Florida Department of Agriculture, industry sources, such as Monsanto Chemical Company, and interviews with farmers.

In November the problem was seen as contamination of some Florida wells where, *The St. Petersburg Times* said, "dangerous concentrations" were found. *The Miami Herald* reported that EDB had spread to "private wells beneath populated subdivisions into kitchen sinks and now to the carefully landscaped, tree-lined country clubs" that many say symbolize the Florida good life. The contamination of wells near golf courses was the result of heavy use of EDB on golf courses.

But the state's efforts to do something about the contaminated wells was hampered by public defiance and disbelief. *The Miami Herald* reported that home owners near the golf courses neither trusted the government's warning nor believed that EDB levels represented a serious danger. A special Florida task force on EDB received no volunteered information to aid them in their investigation. The public was not only not interested in EDB, in spite of newspaper reports, but were resisting government efforts to deal with the problem by refusing to supply necessary data.

The NBC television program "First Camera" tried to raise a clamor about EDB. In one program a reporter asked a Florida housewife what she thought about the government not warning her about EDB in

the drinking water. The housewife looked more puzzled than angry and replied, "it upsets me."

3. THE DISCOVERY OF EDB RESIDUE IN FOOD GRAINS

The situation changed drastically in December. The Florida State Agriculture Commission, probably prodded by criticism from the legislature, began to test grain products on food store shelves on the supposition that, since EDB was used as a grain fumigant, there might be some residues in these products. The Commission found EDB in corn meal, grits, and hush puppies. *The Tallahassee Democrat* asked the question that was probably on everyone's mind: "Should people be alarmed?". Florida Health and Rehabilitation officials, the *Democrat* reported, thought there was potential risk but did not want to frighten the public. The extent of the threat was unclear, but a Health and Rehabilitation Service official said, "We could be sitting on a time bomb." He was right.

No longer was EDB contamination limited to a few isolated wells in Florida. It pervaded to food stuffs on grocery shelves. The news story had been elevated to the position of being a serious public concern. People were now asking: "What does this mean to me? Am I in danger?". *The St. Petersburg Times* quoted a state agricultural inspector who said that people should not be alarmed if they had eaten the tainted products and they need not go to a doctor. On the other hand, he said, "I wouldn't make a diet of it now, don't misunderstand." The inspector said that he would return boxes from the contaminated batches to the store and that it was not their intent to scare people to death, because the level of EDB was not dangerous. But even so, "We don't want it to be there."

Public confusion rose, and growing anxiety agitated the public in spite of the general reassurances of no danger. The very direct microrisk questions, "Am I in danger?" and "What am I to do?" could not be answered in a straightforward manner. There was not enough data to give authoritative answers, but without any official direction the results were bound to be public confusion and a rising anxiety, which was heightened by the sight on television of local stores removing boxes of grain products thought to be contaminated with EDB.

The information from Florida about EDB residue in food products made from grains called for a change in EPA's risk management strategy. But how was the Agency to respond to such headlines as the one in the *Tallahassee Democrat*: "How Dangerous is EDB? No One Knows For Sure." In the *San Jose* (California) *Mercury*, the headline read: "EDB: It Causes Cancer, It's in our Food, But at What Peril?" Grain food products were nationally distributed items and soon after the Florida discovery, officials in Texas, Arizona, North Carolina, South Carolina, Ohio, Pennsylvania, Virginia, California, Wisconsin, Illinois, Massachusetts, and Georgia were contacting government officials in Florida. In response to this new development, EPA took steps in January to shift strategy and convey to the public added reassurances that the Agency was adequately managing the risk.

3.1. Risk Management—Grains

The discovery of EDB residue in food grains came as no surprise to EPA, which had noted EDB residues in grain, flour, and finished baked goods in Position Document #4 (page 58) issued on September 27, 1983. In 1956, before improved instrumentation, only parts per million (ppm) of EDB could be detected and no EDB residues were found in grain products at that level of instrumentation. On the basis of that information, EDB was given an exemption from residue regulation. In the early 1980s, residues were detected by instruments that could measure in parts per billion (ppb). The questions remaining were: How large were the residues in grains, both raw and cooked? What was the safe level of residue?

The sense of those involved in making the EDB decision at EPA in January 1984 was that "the data available at the time the decision must be made" was inadequate but the public concern was forcing the issue. The dilemma faces all regulatory agencies at one time or another: "How can public officials make policy decisions on the basis of complex, poorly understood, and controversial technical data?".

The next question is directly pertinent to this study: "And how can they (the public officials) communicate such data to those directly affected by policy decisions?".[2]

3.2. The EPA Message

On January 13, 1984, EPA announced through a news release that William D. Ruckelshaus, Adminis-

trator of EPA, was sending a letter to the governors of the 50 states requesting data on food products that contained EDB residue. The letter said, in part, "We have to first assess the risk involved before we can act." Mr. Ruckelshaus was considering recommending a national standard for permissible EDB residue, and he was considering whether further regulatory action was appropriate. There was an urgency to this request for data. Ruckelshaus was asking the governors to reply within the week, that is, by January 20, 1984.

In addition to the information in the EPA January news release, the Agency tried to convey a message of candor. Mr. Ruckelshaus was quoted in *The Dallas Morning News* (January 8, 1984), "The truth is we don't know. We're operating in an area of enormous scientific uncertainty. We are operating with substances that the public is terribly afraid of. If they want absolute information, we can't give it to them." He added that EPA was "Trying to proceed as sensibly and rationally as possible. I don't want to unduly alarm the public nor do I want them not to know about it."

3.3. Transmitting the Message

3.3.1. Television

In late December 1983, the major networks were showing the same film clips of food store employees removing boxes of grain products that were supposedly contaminated with EDB. Here was a visual and vivid portrayal. The carrying off of cake mixes and other food grain products became a familiar scene on television news programs.

The other side of the story presented on television during December and January was EPA's point of view. But for EPA to maintain its aspect of candor, no guidance could be offered to those who were asking, "What ought I to do?". Mr. Ruckelshaus appeared on television at the end of December 1983 saying, "If we thought it (EDB) was a hazard, we would remove it." That same message was delivered on television at the beginning of January, and then, near the middle of January, Mr. Ruckelshaus, in an interview, assured the public that EPA was gathering data and would set tolerance levels for EDB residues according to "our best estimate." The Administrator had to admit that the Agency's decision was being made more difficult because of scientific debate caused by scientific uncertainty. "We have," he said, "a lot of speculation and few facts."

3.3.2. Newspapers

3.3.2.1. National Press. The New York Times, during December 1983 and January 1984, maintained its national perspective in reporting about EDB. First of all, the paper's focus was on EPA in Washington and much of the information reported in the news articles was either a direct quote by a spokesman for EPA or by EPA technical staff. One long article, on January 31, 1984, gave a good overview of the whole EDB situation up to that point. Industry, environmentalists, lobbyists, and EPA staff were quoted liberally. An editorial, under the headline, "EDB: A Needless Cancer Scare," on January 21, 1984, accused the government of 10 years of foot dragging. *The Times* noted that Mr. Ruckelshaus faced a tough decision in setting tolerance levels for EDB residues. The editorial asked, "How did the Government get into so tight a spot? The law regulating pesticides is impossibly cumbersome."

The Wall Street Journal expresses stronger opinions on most subjects than *The Times*, and *The Journal* concentrates more on issues that affect business. So one would expect to find an article on its pages, such as the one that appeared February 3, 1984, under the headline, "Consumer Fears on Ethylene Dibromide Hurt Sales of Cereal, Bread and Other Foods." *The Journal* did a survey of supermarket chains around the country and reported that customers *were* concerned about EDB and that sales *were* affected, although not drastically.

An article in *The Journal* on January 13, 1984, "Prefer Worms to EDB in Your Cereal?", produced a flurry of letters from annoyed *Journal* readers. The author of the article was a former Dow Chemical employee. The author began by asking, when was the last time the reader opened a package of cereal and found it wormy? He then described the effectiveness of EDB as a pesticide and its benefits. Pertaining to risk, the author questioned the validity of translating the results of laboratory tests on mice to an effect on human beings, and raised again a long-standing scientific dispute. (The bulk of scientific opinion seemed to favor bioassays. A recent report by a group of scientists concluded, "Although data from studies of rats and mice may not always be predictive of adverse health effects in humans, the scientific validity of this approach is widely accepted.")[3] *The Journal*

article concluded, "Certainly it is inappropriate to allow highly problematic and miniscule risks to completely overshadow proven benefits."

The Journal article was an explicit microrisk assessment. The author dealt directly with the benefits to individuals and placed the issue of risk in individual terms instead of statistical terms. Macrorisk assessment that produces statistical results, such as 3 cancer deaths in 1,000, is less useful to an individual who wants to make a personal decision about risk. The public has little patience for a risk evaluation that concludes with EDB being 1,000 times less risky than aflatoxin, or than smoking a pack of cigarettes. Yet once a risk assessment arrives at a statistical number (i.e., so many deaths per thousand of those exposed) the inclination to launch into comparisons seems irresistible.

The Washington Post published the starkest part of the EPA risk assessment. EPA scientists, *The Post* reported, said that EDB was "the most potent carcinogen tested by that agency and that it rapidly induces tumors on laboratory animals even at minute dosages." In addition, EDB was linked to birth defects, *The Post* said, and male sterility. The statistic, 3 cancer deaths in every 1,000 exposed to EDB over a lifetime, appeared a number of times in *Post* articles. The paper reported that this figure meant that there would be three-quarters of a million cancer deaths from EDB by the middle of the next century and added that this estimate was a risk assessment, "as they are called," and they were subject to scientific dispute. *The Post* did discuss some of the more technical aspects of risk assessment and of the scientific uncertainty connected with the technique. Nevertheless, the grim figures about cancer deaths were given prominence.

3.3.3.2. Local Press. In Florida, one of the states with legislative authority for setting residue standards on food stuffs, the residue level for EDB was established as one part per billion (ppb) and for drinking water 0.1 ppb. The (Jacksonville) *Florida Times-Union* quoted the chairman of the Department of Entomology and Nemotology at the University of Florida as saying that 1 ppb was "ultraconservative." On the other hand, the paper noted that the state health officer thought that, "It is a bad chemical, one of the worst." No absolute statement could be made about the risk from EDB or, as *The Tallahassee Democrat* wrote: "Risk assessment was a complicated matter." Scientists examining similar situations can reach "wildly varying conclusions."

The Tallahassee Democrat also quoted a biostatistician at EPA who said that the government's risk assessments were not realistic. "There's too much unknown. The scientific knowledge is not there to do it." Another official at EPA was quoted in the *Democrat* as saying that EDB had to be eradicated because the slightest exposure caused cancer. This official said, "Any level of exposure entailed some risk."

The more sources questioned, (the *Democrat* had a wide variety of them), the more difficult it was to state the microrisk perception. The *Democrat* consulted with a government epidemiologist and entomologist at the University of Florida, four officials at EPA, representatives of the grain milling industry, a representative of Dow Chemical Company (an EDB manufacturer), and a 1978 test report in the University of Florida library. No authority was willing to give definitive answers, and a conflicting statement could be found for any assertion. Public confusion and consternation was on the increase all during the month of January 1984.

4. CONCLUSION

In February 1984, EPA issued an emergency suspension against use of EDB in grain milling or storage and, at the same time, established tolerance levels for residue EDB in foodstuffs. This last action answered the question: Can I eat the cake mix? The answer was yes, if the residue falls within the recommended levels. EPA started the process for removing EDB from the food chain altogether by a combination of actions. Public anxiety over EDB subsided, and EDB disappeared from the newspapers and was heard no more on television.

What should EPA have done? As far as this analysis goes, EPA did all that was possible with the public information tools that were available. EPA, like so many other regulatory agencies, has a dual role. The first role is to make decisions about allowing or prohibiting and in setting standards. In that regulatory process, the public's views and comments must be taken into account. The other agency role is public information. Since the success of regulation depends on public participation, in that process, part of the agency's responsibility is seeing that public participation is informed.

The regulatory role is that of macrorisk assessment and management. The public information role is that of microrisk assessment. The distinction be-

tween these two is extremely important and until an agency learns to manage both roles well it will be confronting crisis after crisis.

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