

LC 14. 2/2: 84-545 ENR

1-31-85



84-545 ENR
Congressional Research Service
The Library of Congress

Washington, D.C. 20540

EDB AND THE AGRICULTURE COMMUNITY: A BACKGROUND DISCUSSION

by

Jeffrey Zinn
Specialist in Natural Resources Policy
Environment and Natural Resources Policy Division
February 9, 1984
(updated March 19, 1984)

ABSTRACT

EDB is being removed from major agricultural uses because of concerns about possible adverse effects on human health. Regulatory actions to remove EDB from the food system will have impacts on the agricultural community. Uses of EDB in agriculture, regulatory actions to remove EDB from the food system quickly, and possible impacts of those regulatory actions on domestic and international markets are discussed.

EDB AND THE AGRICULTURE COMMUNITY: A BACKGROUND DISCUSSION

Introduction

The Environmental Protection Agency (EPA) has taken actions to limit all major agricultural uses of ethylene dibromide in the future. On September 30, 1983, EPA suspended use of EDB as a soil fumigant. In a second action, EPA announced the emergency suspension of use of EDB as a fumigant for raw grain and milling machinery on February 3, 1984, effective March 4, 1984. And most recently, March 2, 1984, EPA suspended the last major use of EDB, to fumigate citrus fruit, effective September 1984 and set an interim tolerance of 30 parts per billion for the edible portions of the fruit. 1/

At issue now is not whether EDB should be removed from the food system, but how quickly it should be taken out. EPA has agreed, based on its own assessment of possible risks, that EDB is a threat to human health. 2/ State officials and environmental groups have raised concerns, publicized in numerous media accounts, about relationships between EDB residues in agricultural products, and regulatory efforts to minimize and eliminate the impact of this contamination on human health. For the agriculture community, two general questions are of greatest concern; how can farmers, processors and distributors replace EDB while protecting their products, and what approaches should be taken to reduce concentrations already identified in food and food products to acceptable levels?

1/ Mangoes and some very minor use commodities are not included under the March 2, announcement. EPA plans to propose tolerances for these commodities at a future date.

2/ This view is summarized in EPA Position Document 4 published in September, 1983.

Recently, congressional interest in EDB has heightened in response to different actions in various States to limit EDB residues in food, along with the perception that EPA has not moved rapidly enough to control this chemical. Congressional interest centers on ascertaining the degree of the health hazard, assessing EPA's regulatory attempts to control that hazard, and determining how that response might affect the agriculture sector. A number of congressional committees have conducted briefings or oversight hearings in the past two months to learn more about the EDB problem and to better define the issues.

This paper provides some background information on both the uses of EDB and the effects of EPA's regulatory actions on the agriculture community. Some questions addressed in this paper include:

1. How will the regulatory controls being placed on future domestic EDB uses in agriculture and food processing affect the distribution and sale of food products contaminated or tainted by EDB? 3/
2. What are the costs, benefits and limitations associated with alternatives to EDB?
3. How is EDB used and regulated in other countries; how will regulatory decisions in this country affect U.S. agricultural exports and imports?
4. How much do contamination tests cost, who pays for them, and how long do they take to complete?

Two other CRS reports discuss other issues surrounding the EDB controversy. A CRS report by Michael Simpson entitled Ethylene Dibromide (84-578 SPR) provides information about some of the health impacts of EDB, as well as alternative chemical fumigants. A CRS report by Jim Aidala entitled Ethylene Dibromide: Regulatory Framework discusses past and future controls over the use of EDB.

3/ Contaminated means in concentrations greater than EPA guidelines, while tainted means in concentrations smaller than EPA guidelines.

Background

EDB is a hydrocarbon pesticide. Over 300 million pounds are produced annually in this country. An estimated 20 million pounds has been used annually as a pesticide and fumigant in recent years. The remainder is used as an anti-knock additive in leaded gasoline.

EDB is used for six purposes in agriculture. Four of the six uses have been important to agriculture; for soil fumigation, for raw grain fumigation, for spot fumigation of milling machinery, and for quarantine fumigation of citrus fruits and papayas. The other two uses, fumigation of felled logs and beehives, have been less important. The uses are detailed below. The status of each use and alternative to EDB are also discussed.

1. Soil Fumigation. Soil fumigation has been the main use of EDB. ^{4/} More than 90 percent of the agricultural use, by weight, has been as a soil fumigant. EPA halted this use on September 30, 1983 by issuing an emergency suspension which immediately terminated the sale and distribution of EDB as a soil fumigant. (Existing stocks on hand were allowed to be used.) As a soil fumigant, EDB was used primarily to control nematodes, mostly in the Southeast. Discovery of EDB residues in groundwater in areas where it had been used as a soil fumigant was the major reason cited by EPA for halting use of EDB for this purpose. Residues have been found in groundwater in Florida, California, Hawaii and Georgia.

^{4/} Fumigants are formulated as solids or liquids but are effective as gases. Soil fumigants penetrate the soil to control soil insects and nematodes.

Loss of EDB as a soil fumigant may be a problem for agriculture. Some alternative chemicals have already been suspended for reasons similar to EDB. Other chemical options which are believed to be less of a threat to human health are, however, also less effective. Non-chemical options, such as a combination of crop rotation and specific tillage practices, may be helpful, but their effectiveness will be limited unless farmers can be convinced to adopt them. Still another concern is the continuing evolution of pest problems. For example, the cyst nematode, which first appeared in 1980 is now a serious pest affecting soybean production in some sections of the southeast. The effectiveness of alternatives to EDB on this pest are not yet clear. 5/

2. Raw Grain Fumigation. A second major use of EDB has been to fumigate unprocessed grain in storage. EDB is particularly effective for this use because it penetrates the shell of the grain and destroys the eggs of pests. EPA ordered the termination of the sale or use of EDB as a fumigant for grain, effective March 3, 1984. A portion of the 7.7 billion bushels of U.S. grain currently in storage has been treated with EDB or has been mixed with treated grain. Estimates of the amount of grain tainted vary from 2 percent to more than 50 percent of the stored supply (0.15 billion bushels to 3.9 billion bushels). Mixing the fumigated grain with other grain could dilute the concentration but would taint a larger portion of the stored grain.

Alternative fumigants such as phosphine (aluminum phosphide) are available. These alternatives, however, are generally considered to be less effective than EDB, and many are suspected of adversely affecting human health. 6/

5/ Phone conversation with Dr. Richard Parry, coordinator of the USDA Task Force on EDB alternatives, February 3, 1984.

6/ Ibid.

3. Spot Fumigation of Milling Machinery. EDB has also been used to fumigate milling machinery in some mills. Most millers voluntarily stopped using EDB by September 30, 1983 because of growing publicity about its adverse effects on human health. The EPA terminated the use of EDB in mills, effective March 3, 1984. EDB use has varied from mill to mill. Modern mills with newer equipment and technologies to process grains do not need fumigation to meet health standards. But, a number of older mills that lack modern equipment do need to use fumigation. Generally, the mills which used EDB tended to be smaller and many of them baked specialty products.

While millers have voluntarily stopped using EDB, its loss may have an impact on older mills. The most effective alternative to EDB for controlling pests is steam treatment. It may be expensive to modify older facilities to make steam treatment possible. It is too early to determine what effect the loss of EDB will have on mill operations, especially in older facilities where acceptable sanitary conditions are more difficult to maintain. 7/

4. Quarantine Fumigation. In addition, EDB has been used as a fumigant to control the spread of fruit flies in the shipping of citrus fruits. 8/ Approximately 50,000 pounds, or less than 1 percent of EDB used in agriculture was used to fumigate citrus in 1983, according to the EPA. Approximately 2 percent of the fresh citrus fruit consumed domestically is fumigated, according to EPA. Four fruit flies have been declared quarantine pests by the Department of Agriculture (USDA); three of them (Mediterranean, Oriental and Melon) are limited to Hawaii. 9/

7/ Ibid.

8/ EDB has also been used to fumigate some vegetables.

9/ The Medfly has been introduced into this country 4 times since 1975. But on only one occasion, in California, did it get established. The cost of eradication was approximately \$100 million.

The fourth, the Mexican fruit fly, is found in Texas. The USDA quarantine means that fruit shipped in the United States must either be certified to be free of the pest or be treated to remove the pest.

A fifth fruit fly, the Caribbean fruit fly is found in Florida and is not quarantined by USDA. But Texas, Arizona, California and Japan have quarantined this pest, so any citrus shipped from Florida to these States or Japan must either be certified to be free of pests or be treated. Florida is phasing out domestic use of EDB to meet quarantine requirements, replacing it with methyl bromide. The State is working out agreements for using this different fumigant with Texas, Arizona and California. These changes have occurred so rapidly that EPA Administrator Ruckelshaus was able to state, on March 2, 1984, that; "the use of EDB on citrus in the United States has essentially ceased". 10/

Alternatives to EDB as a quarantine fumigant vary with the product (for example, grapefruits and oranges, and early and late season varieties) and distance to market. For example, for Florida grapefruit shipped to Japan, cold storage treatment, a process that requires 28 days, is effective. But this treatment is not useful for brief interstate shipments. Chemical alternatives, such as methyl bromide and phosphine, are available, but may be less effective. Staff at the US Department of Agriculture (USDA) believe none of these methods are ready to implement this grapefruit season, but an acceptable approach should be ready by next season—in the fall of 1984. 11/

The EDB controversy may bypass Texas grapefruit producers this year. The cold weather of December 1983 and January 1984, which killed much of

10/ Statement by William Ruckelshaus on actions taken to control residues from EDB on citrus and papayas, March 2, 1984, p.2.

11/ Phone conversation with Dr. Richard Parry, February 4, 1984.

the crop, also reduced the Mexican fruit fly population. Mexico and the United States are now attempting to control this fruit fly by applying chemical treatments to eradicate its population north of an ecological barrier in Northern Mexico. If this effort is successful, Texas citrus will not require fumigation for fruit flies in the future.

Another fruit being tested for alternative treatments is papaya, grown in Hawaii. The most promising option to EDB is a cold treatment that requires several days to be effective. When this fruit is shipped by boat, the treatment has time to work, but when shipped by air, such as to east coast markets, faster treatments are needed. Shippers are now cooperating with USDA to test a wider range of alternatives. 12/

5 and 6. Other Fumigation Uses: The other two agricultural uses of EDB, to kill bark beetles in felled logs and to kill wax moths in beehives, are minimal in both volume of chemical used and potential for impact on human health. EPA has cancelled use of EDB in felled logs, a decision the State of Colorado is appealing. EPA has not cancelled EDB's use in beehives, but has required some label changes.

Regulatory Controls on EDB Use

Background information on the development of regulatory controls on the uses of EDB is discussed in the CRS paper by Jim Aidala. It is important to remember that while the Environmental Protection Agency has recommended standards for EDB, States are free to set stricter standards. Several States, including Massachusetts, California, Texas and New York have established, or are considering more stringent standards to EDB levels

12/ Development of Alternative Technologies for Quarantine Treatment of Fruits and Vegetables. Report prepared by USDA at the request of Congress, February 15, 1984. p. 12-17.

in milled grain products, such as cake and hush puppy mixes, and ready to-eat products, such as cookies and bread. A survey of states published in the February 8, 1984 edition of USA Today reports that 10 states have banned certain goods tainted with EDB. Another 29 states have accepted EPA's guidelines for maximum EDB concentration for grain-based foods. These guidelines are 900 parts per billion in raw grains, 150 parts per billion in milled grain and 30 parts per billion in ready-to-eat products. On February 25, 1984, six northeastern states (New York, New Jersey, Connecticut, Maine, New Hampshire and Vermont) announced more stringent permissible levels for EDB; 50 parts per billion for milled grain, 10 parts per billion for ready-to-eat products, and zero tolerance in baby foods.

Until recently, opinions on the degree to which the country's grains and citrus have been tainted by EDB have varied. Generally, groups representing food processors and distributors have minimized the extent of the problem. The Grocery Manufacturers of America reports that extensive sampling indicates an average EDB residues of 2 parts per billion or less. ^{13/} As a result, they have argued that the current risks are not great and will continue to decline, so standards are not necessary. Meanwhile, environmental groups and consumer activists have emphasized that EDB residues are both widespread and serious, and no level should be considered "safe." They have pushed for standards more stringent than those recommended by EPA. EPA's guidelines can be viewed as a compromise between these two points of view.

A rapidly growing number of samples taken around the county are yielding more information about the degree to which foods are tainted. The relationship

^{13/} Information presented at a Senate Agriculture Committee briefing, January 24, 1984.

between EDB and the American diet can be viewed in two ways, based on this additional information.

First, the typical American diet probably contains about 3 parts per billion of EDB in grain products, according to information provided by a staff member representing EPA at a Senate Agriculture Committee briefing, held on February 8, 1984. According to this official, this level will decrease to zero in three to five years as EDB use stops and tainted products are gradually consumed. EPA has concluded that the incremental risk to human health during the time period when EDB is phased out will be extremely small.

Second, samples show that while a large portion of the grain in storage is tainted with EDB, only a small portion of that grain exceeds EPA's recommended guidelines. In addition, only a small portion of mixes and ready-to-eat products also exceed EPA's recommended guidelines. EPA has now compiled data from several thousand samples examined by Federal agencies and their contractors, States, and the Grocery Manufacturers of America. The data show that about 2 percent of the total grain in storage exceeds the raw grain guideline of 900 parts per billion. Concentrations in stored grain can be reduced to acceptable levels by heating, by aerating, or by just letting it sit (the gas slowly dissipates.) ^{14/} About 1 percent of the mixes containing wheat flour and 7 percent of the mixes containing corn flour exceed the guideline of 150 parts per billion.

^{14/} Some critics concerned about the possible effect of EPA's regulatory actions on the supply of stored grain have suggested that contaminated grain could be mixed with other grain to reduce average concentrations of EDB below EPA's guidelines. Under the Food and Drug Administration's guidelines for good manufacturing practices, processors are prohibited from mixing lots found to be "adulterated" (exceeding allowable tolerances) to reduce concentrations of regulated substances.

Only 1 to 2 percent of the tested ready-to-eat products exceed the guideline of 30 parts per billion. The fact that about 64 percent of the wheat in ready-to-eat products is used in manufacturing white bread, a process which appears to remove all detectable quantities of EDB, may partially account for this low percentage of contamination.

Alternatives to EDB

The Department of Agriculture is exploring alternatives for the four major agricultural uses of EDB, while concentrating on fumigation of fruits and vegetables. It submitted a study of alternative fruit and vegetable fumigants to the House Agriculture Committee in response to provisions inserted into the Agriculture Department's Appropriations legislation in the fall of 1983. The report, Development of Alternative Technologies for Quarantine Treatment of Fruits and Vegetables, was submitted to Congress in February, 1984 and published by the Committee. Many of the alternatives examined in their report were discussed earlier in this paper. To summarize these discussions, other chemicals are likely to have impacts similar to EDB on human health and may be less effective as fumigants. The CRS white paper, Ethylene Dibromide, by Michael Simpson reports on acute and long-term effects of four alternatives; methyl bromide, carbon disulfide, carbon tetrachloride, and ethylene dichloride. Some other effective treatments require extended storage times under precise conditions. One other treatment receiving considerable attention is irradiation. This treatment, strongly supported by the Food and Drug Administration as a long term alternative to EDB, is expensive. In addition, wide-spread use of irradiation for fruits and vegetables would not be available for 3 to 5 years, according to a spokesperson for this industry. 15/

✓ 15/ Issues surrounding irradiation^A are discussed in USDA's paper on Alternatives, submitted to Congress February 15, 1984, p. 20.

Bills to promote use of irradiation were introduced late in the first session in both houses (H.R. 4555/Morrison of Washington and S.2254/Gorton). The USDA alternatives report includes detailed estimates of treatment costs associated with several of the alternatives for treating grapefruit and papaya.

Use of EDB in Other Countries

Concerns have been expressed about contamination by EDB of certain food products imported into this country. EDB is used by a number of other nations including most tropical and subtropical exporters of citrus and fruits where fruit flies are found. About 7 percent or 40 million pounds of the citrus consumed in this country is imported, according to USDA. EPA, in their March 2, 1984 announcement, stated that about 50 samples of imported citrus contained from 1.3 to 2200 parts per billion in the edible portion of the fruit. Imports now must meet the interim tolerance of 30 parts per billion.

United States agricultural exports could also be affected by the domestic controversy about EDB contamination. One major importer of U.S. grain, the USSR, has inquired about the extent of the EDB contamination problem.

A second export concern is the citrus quarantine requirement of Japan. If fumigation with EDB is prohibited, Japan could refuse to buy Florida citrus and an export market with an estimated value of \$28 million could be lost to Florida citrus producers. Most of the citrus exported to Japan is grapefruit. About 18 percent of Florida's fresh grapefruit, 293 million pounds in the 1982/83 season, was shipped to Japan. No data on EDB levels in exported citrus is available from Japan. However fumigated fruits have averaged over 200 parts per billion of EDB when received in California from Florida over a five year (1977-82), according to State officials, and the highest sample exceeded 5,000 parts per billion. EPA stated, in their March 2, 1984 announcement,

that exports from this country could still be fumigated with EDB to meet the requirements of the importing country.

Despite these concerns expressed by Japan and the USSR, the domestic controversy and regulatory actions appear to be having little impact at this time on international markets for U.S. commodities affected by EDB.

Testing for EDB

Testing for EDB is a standardized process that any toxicology laboratory with modern equipment should be able to undertake. The standard EDB test requires about three days and costs \$200 dollars or less. Tests of mixes before and after preparation are more expensive; EPA stated at a briefing for the Senate Agriculture Committee that it recently paid \$100,000 to have 40 samples tested. ^{16/} The Federal government and over 40 States have been testing for EDB. Federal and state agencies have limited funding available to test for EDB. Because of growing public concern about EDB, agencies are diverting funds intended for other purposes to test for EDB. In addition, the high priority given to testing for EDB has forced states to delay other food-testing activities. EPA and Food and Drug Administration representatives, while briefing the Senate Agriculture Committee staff, also stated that they do not foresee a shortage of laboratory facilities or testing equipment so any limitation on testing will be caused by lack of funds. As more is learned about EDB, tests can be concentrated increasingly on those types of products that are found to most often contain levels that exceed Federal guidelines. This information should better enable regulating agencies to determine which brands and batches should be removed from market shelves.

^{16/} Comment by EPA staff in response to questions. Briefing held by Senate Agriculture Committee, February 8, 1984.

Summary

Federal agencies, States and interest groups such as the Grocery Manufacturers of America are all pressing for resolution of the EDB issue. Congress does not currently have any legislative proposals on this issue, but has been responding to constituent concerns and confusion with oversight hearings and briefings. More information on amounts of EDB in foods, alternatives to EDB, costs of alternative solutions to the EDB problem and EDB in the world's food supply is rapidly becoming available. Congress will doubtless continue to monitor this information as well as EPA regulatory decisions to determine if the public's health is being protected in a timely manner while disruptions to the production, distribution and sale of food are minimized.