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U.S. and Mexican Regulation of Methyl Bromide: Comparing Pesticide Regulations After NAFTA

by

Kyle W. Lathrop and Cindy K. Bushur-Hallam

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U.S. AND MEXICAN REGULATION OF METHYL BROMIDE: COMPARING PESTICIDE REGULATIONS AFTER NAFTA

KYLE W. LATHROP* & CINDY K. BUSHUR-HALLAM**

I. Introduction

Pesticides are one of this century's great agricultural ironies. Pesticide use allows for tremendous increases in productivity and permits food and fiber production in areas that would have been impractical to cultivate without pesticides.[1] Conversely, pesticides prove to be one of the significant human environmental dilemmas of this century: persistence and toxicity of pesticides, misuse in applications, and pest resistance all extract a toll on human health and the environment. A necessary role for pesticides exists, but policy makers must account for potential costs and balance them against the benefits to ensure that pesticide benefits do not come at the expense of high health and environmental costs. This need, to balance costs against benefits, is intensified in the realm of agricultural trade, as pesticides and products grown with pesticides move across political boundaries.

Part of this problem stems from differing pesticide regulations for production, use, and residue tolerances in different countries,[2] but the lack of economic rationales in creating policies compounds the problem. A need to combine the law

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* Temporary Instructor, University of Georgia, College of Agricultural and Environmental Sciences, Athens, Georgia; LL.M. expected June 1996, University of Arkansas; J.D. 1992, University of Iowa; B.S. 1987, University of Wyoming.

** Attorney, Herrin, Illinois; LL.M. expected June 1996, University of Arkansas; J.D. 1994, Southern Illinois University; B.S. 1990, University of Illinois. The authors wish to thank Professor John S. Harbison for his assistance and suggestions with this article.

1. *See generally Living History Interview: Dr. Norman E. Borlaug*, 1 TRANSNAT'L L. & CONTEMP. PROBS. 541, 551-552 (David S. Ladwig ed., 1991) (discussing environmental concerns relating to the increased agricultural productivity of the "Green Revolution"); ROBERT BOARDMAN, PESTICIDES IN WORLD AGRICULTURE: THE POLITICS OF INTERNATIONAL REGULATION 1-3 (1986) (presenting benefits and costs of modern pesticide usage in a regulatory context); WILLIAM HARRISON WELLFORD, THE ADVOCACY GAP IN GOVERNMENT REGULATION OF FOOD AND CHEMICALS 191-220 (1988) (describing federal investigation of 2,4,5-T herbicide).

2. GENERAL ACCOUNTING OFFICE (GAO) REPORT, PESTICIDES: U.S. AND MEXICAN FRUIT AND VEGETABLE PESTICIDE PROGRAMS DIFFER, 2-4 (Feb. 18, 1993) (citing testimony of Peter F. Guerrero). Part of the problem in formulating pesticide policies that have international uniformity comes from the multiple agencies within a single country that affect pesticide policy. In the U.S., the Environmental Protection Agency (EPA), the Food and Drug Administration, and the U.S. Dept. of Agriculture all play a role in the U.S. pesticide policies. *Id.* at 2. Further complications arise because state governments can regulate, albeit on a limited basis, the use and application of pesticides.

and economics for international trade and environmental issues has been identified,[3] but little of this approach has yet to be applied thoroughly. Although a complete description of the economic factors is beyond the scope of this paper, those factors should be regarded in the context of pesticide regulations and trade policies.[4] Only by considering the legal and the economic factors involved in U.S. and Mexican agriculture can a coherent pesticide policy be developed.[5]

An example of this need to balance pesticide costs against benefits in the context of international agricultural regulation and trade is presented with the chemical compound methyl bromide (CH_3Br). Described generally as a "biocide," methyl bromide (MeBr) is extremely effective in exterminating nearly any type of pest.[6] More specifically, methyl bromide is a broad-spectrum fumigant that can be used against pests in the soil, in foods and grains, and in storage facilities.[7] As a potent biocide, methyl bromide can inflict dire effects for humans exposed to it.[8] Smaller

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3. *See generally* J. Andres Espinosa & V. Kerry Smith, *Measuring the Environmental Consequences of Trade Policy: A Nonmarket CGE Analysis*, 77 AM. J. AGRIC. ECON. 772 (1995) (noting that the recent implementation of the World Trade Organization through GATT negotiations would necessitate analysis of the conflict between environmental protection and competitive business); Kurt C. Hofgard, *Is This Land Really Our Land?: Impacts of Free Trade Agreements on U.S. Environmental Protection*, 23 ENVTL. L. 635, 664-65 (1993) (noting that international legal structures for trade policies are no longer separate from the legal structures for local and international environmental protection); Robert F. Housman & Durwood J. Zaelke, *Making Trade and Environmental Policies Mutually Reinforcing: Forging Competitive Sustainability*, 23 ENVTL. L. 545 (1993) (proposing that economic incentives can be incorporated in trade and environmental policies such that the policies bolster improved business activity and better environmental health).

4. *See* Brian R. Copeland and M. Scott Taylor, *Trade and the Environment: A Partial Synthesis*, 77 AM. J. AGRIC. ECON. 765-771 (1995) (constructing an economic model to determine whether "dirty" industries will migrate to nations with less strict regulatory structures if pollution is a by-product of the product's consumption); Espinosa & Smith, *supra* note 3, at 772-77 (developing the first economic model to combine nonmarket and computable general equilibrium (i.e., market) factors to reflect trade and environmental policy decisions).

5. Hofgard, *supra* note 3, at 661-64 (discussing the general differences between the U.S. and Mexican pesticide regulations and risk assessments); *see also* John Beghin et al., *Trade Liberalization and the Environment in the Pacific Basin: Coordinated Approaches to Mexican Trade and Environmental Policy*, 77 AM. J. AGRIC. ECON. 778-79 (1995) (discussing the increasing amount of analytical investigations of trade and environmental linkages as policy makers attempt to coordinate trade liberalization with specific environmental protection goals).

6. SHIRLEY A. BRIGGS, BASIC GUIDE TO PESTICIDES: THEIR CHARACTERISTICS AND HAZARDS 164 (1992); *see also* R.W. D. Taylor, *Methyl Bromide — Is There Any Future for This Noteworthy Fumigant?*, 30 J. STORED PROD. RES. 253 (1994); U.S. DEP'T OF AGRIC., NATIONAL AGRICULTURAL PESTICIDE IMPACT ASSESSMENT PROGRAM, BIOLOGIC AND ECONOMIC ASSESSMENT OF METHYL BROMIDE BAN 5 (1993) [hereinafter NAPIAP REPORT]; WILL ALLEN ET AL., OZONE ACTION INC., OUT OF THE FRYING PAN, AVOIDING THE FIRE: ENDING THE USE OF METHYL BROMIDE 5-6 (1995); WILL ROSTOV & ANNE SCHOENFIELD, PESTICIDE ACTION NETWORK NORTH AMERICA, PROSPERING WITHOUT METHYL BROMIDE: A CRITIQUE OF USDA'S ANALYSIS OF A METHYL BROMIDE BAN 1 (1994).

7. U.S. GEN. ACC'G OFFICE, THE PHASEOUT OF METHYL BROMIDE IN THE UNITED STATES 5 (Dec. 1995) (GAO/RCED-96-16) [hereinafter GAO REPORT]; U.S. DEP'T OF AGRIC., METHYL BROMIDE SUBSTITUTES AND ALTERNATIVES: A RESEARCH AGENDA FOR THE 1990S 8 (1993) [hereinafter RESEARCH AGENDA].

8. GAO REPORT, *supra* note 7, at 5 (describing methyl bromide as "a very toxic substances whose effects on human health depend on the concentration and duration of the exposure").

amounts of methyl bromide poisoning result in chronic respiratory, circulatory and neurological effects and it can be fatal in sufficiently large doses. Besides its tremendous toxicity as a pesticide, methyl bromide has another characteristic that makes it unique from a regulatory perspective: scientific evidence indicates methyl bromide destroys the ozone.[9]

Much has been written about the "circle of poison" that the U.S. and other developed countries create by manufacturing and exporting pesticides to developing countries.[10] Pesticides may be banned or restricted for domestic use, but domestic production of those same pesticides continues. In turn, those exported pesticides are used to produce foods imported to the U.S., leaving domestic consumers with the same level of exposure to the problem pesticide as if it had continued to be used domestically.[11] At the same time, the farm workers and others are exposed to the detrimental health and environmental effects of the pesticide in developing countries.[12] This type of circular arrangement exists with methyl bromide, albeit the movement of methyl bromide is more complex than a simple circle. Currently, methyl bromide is still manufactured and used domestically, and the U.S. government continues requiring certain imported food and plant materials be treated with methyl bromide. At the same time, methyl bromide is manufactured and used in other countries, and some other nations require food from the U.S. be fumigated with methyl bromide.[13] The wide transboundary movement of methyl bromide and products treated with methyl bromide make it especially appropriate for regulatory analysis.

This paper first examines the uses and characteristics of methyl bromide[14] and then presents a brief overview of the U.S. pesticide regulatory regime, analyzing

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9. Taylor, *supra* note 6, at 255 (listing the studies from 1990 through 1992 that documented the ozone depleting potential of Methyl Bromide).

10. Carrie Dolmat-Connell, *After NAFTA: Can a New International Convention on Toxic Trade Be Far Behind?*, 12 B.U. INT'L L.J. 443, 445-46 (describing the number of chemicals banned for U.S. domestic use that are still manufactured for export, and noting that the National Agricultural Chemicals Association, more than one-third of all exported pesticides are not registered with the Environmental Protection Agency); Charlotte Uram, *International Regulation of the Sale and Use of Pesticides*, 10 NW. J. INT'L L.& BUS. 460, 462-463 (1990); Kristina L. Baird, Comment, *No More Excuses: Adopt the "Circle of Poison Prevention Act of 1991"*, 21 CAP. U. L. REV. 963, 974-975 (1992) (describing earlier attempts to ban export of domestically produced pesticides that had already been banned for domestic use); Mark A. Kablack, Note, *Pesticide Abuses in Third World Countries and a Model for Reform*, 11 B.C. THIRD WORLD L.J. 277, 285-86 (1991).

11. The EPA estimates that approximately 450 million pounds of pesticides are exported annually from the U.S. Baird, *supra* note 10, at 965 (citing EPA Pesticide Export Policy Review, 55 Fed. Reg. 4956 (1990)). Of that amount, the EPA estimates that about one-third comprise pesticides banned in the U.S.

12. Dolmat-Connell, *supra* note 10, at 445 (citing J. Jeyaratnam, *Acute Pesticide Poisoning: A Major Global Health Problem*, 43 WORLD HEALTH STAT. Q. 139, 140 (1990) (describing a study that estimates three million people suffer annually from acute pesticide poisoning)).

13. *Stenholm Hybrid Bill Hoped for in Food Safety Legislation*, PEST. & TOXIC CHEM. NEWS (CRC), Oct. 27, 1993, at 3 (noting that Japan has threatened to ban U.S. food products if methyl bromide fumigation is discontinued).

14. *See infra* notes 18-72 and accompanying text.

U.S. regulation of methyl bromide.[15] The paper then presents an overview of Mexico's agriculture and its regulation of pesticides in general and methyl bromide specifically.[16] The paper concludes by proposing a pesticide policy that builds on existing North American Free Trade Agreement (NAFTA) provisions for better trade and environmental benefits in the long run.[17]

II. Characteristics and Uses of Methyl Bromide

Methyl bromide (MeBr) is a powerful compound that has been used as a pesticide for more than sixty years.[18] Methyl bromide is a dense, colorless gas with a musty odor at extremely high concentrations.[19] It is especially well-suited for use as a fumigant because of several inherent chemical properties.[20] First, methyl bromide is more than three times heavier than air, so it can be used with efficacy in sealed containers.[21] This density permits methyl bromide to be used in a variety of fumigation applications that do not require an airtight seal for efficient use. Currently, methyl bromide is used to fumigate grain bins, silos, the cargo holds of ships, and even in bagged grain under tarps.[22] Because methyl bromide fumigation depends on containment and continued exposure to the pests for its effectiveness, this density is very important. Once sealed in a container or under tarps, methyl bromide remains in the contained space at high concentrations because of its density.

The second attractive chemical characteristic of methyl bromide is its high volatility.[23] Once the pesticide applicator opens the grain bin or other container, it dissipates rapidly after the compound has been applied to the intended pests.[24]

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15. *See infra* notes 73-146 and accompanying text.

16. *See infra* notes 171-269 and accompanying text.

17. *See infra* notes 308-333 and accompanying text.

18. Taylor, *supra* note 6, at 253 (discussing history and unique chemical properties of methyl bromide as an insecticide fumigant).

19. John V. Marraccini et al., *Death and Injury Caused by Methyl Bromide, An Insecticide Fumigant*, 28 J. FORENSIC SCI. 601 (1983) (describing chemical properties of methyl bromide). Commercial mixtures of methyl bromide contain a specified concentration of chloropiricin, a "warning" compound that induces immediate tearing in humans. *Id.* at 606. In some instances, this concentration of the warning compound has been alleged to be insufficient to alert others to the presence of methyl bromide. *Id.* Taylor notes that approximately sixteen known chemical compounds have been used as fumigants, but only two (methyl bromide and phosine) "are in regular worldwide use." Taylor, *supra* note 6, at 253. The other fourteen fumigants are no longer used because of their human health hazards. *Id.*

20. BRIGGS, *supra* note 6, at 164. Methyl bromide is or has been commercially distributed in the U.S. under the following trade names: Bedfume, Brom-O-Gas, Brozone, Celfume, Dowfume, Embafume, Fumigant-1, Iscobrome, Kayafume, Meth-O-Gas, PestMaster, Profume, Terr-O-Gas, and Weed Fume. *Id.*

21. Taylor, *supra* note 6, at 253.

22. Marraccini et al., *supra* note 19, at 601. Methyl bromide has been used as a fire extinguishing agent because of its density and nonflammability. *Id.*

23. Taylor, *supra* note 6, at 253-54.

24. BRIGGS, *supra* note 6, at 164 (noting that MeBr is water soluble, highly volatile, and nonflammable).

Although this high volatility presents a significant problem because of methyl bromide's effects on the ozone, it does make the compound an easily-used fumigant. After the necessary treatment period has elapsed, the methyl bromide can be released into the atmosphere, leaving little to no residue on the treated material. The third characteristic is that early research indicated methyl bromide is effective against insects at all stages of development.[25] This wide-spectrum potency means that methyl bromide can be effectively used to kill eggs, larvae, nymph and adult stages of all insect pests. Later research found that methyl bromide is highly effective against soil-borne fungi, viruses and bacteria, as well as rodents.[26] Finally, methyl bromide is easy to manufacture and it is unpatentable,[27] so it is an inexpensive fumigant as well. Given its relative simplicity, low cost and great effectiveness at killing pests, methyl bromide has become one of the most widely used pesticides throughout the world.[28]

In light of its effectiveness and low cost, it is not surprising that methyl bromide still plays an important role in U.S. production agriculture and in food trade. One indication of the continuing widespread domestic use of methyl bromide comes from a recent workshop sponsored by the United States Department of Agriculture (USDA) to discuss methyl bromide alternatives.[29] At this workshop, participants were organized into two major groups according to their use of methyl bromide. The first group, Postharvest Commodity and Quarantine, included producers and processors of dried fruits and nuts, grains and milled products, and non-food products such as ornamental plants and forestry products.[30] The second group, Soil Fumigation, included producers and processors of strawberries and other small fruits, tree fruits and nuts, solanaceous crops (such as tomatoes, peppers and tobacco), forestry, nursery and horticultural crops, and leafy and other vegetables.[31] Between the two groups, a wide range of methyl bromide users are represented, all having an interest in maintaining pest-free commodities.

Further evidence of the continued use of methyl bromide are the "specific" and "quarantine" exemptions granted by the U.S. Environmental Protection Agency (EPA) for agricultural pest applications.[32] For instance, within the last two years, the EPA has exemptions to use methyl bromide on imported cucumbers,[33] exported

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25. Marraccini et al., *supra* note 19, at 601.

26. Taylor, *supra* note 6, at 253, 255. Using methyl bromide to control rodents aboard aircraft is currently the only viable option, as the other fumigant, phosine, would damage the aircraft and related equipment if used. *Id.* at 255.

27. *Id.*

28. *Id.* at 254 (listing the various pesticide applications of methyl bromide).

29. ALTERNATIVES TO METHYL BROMIDE: ASSESSMENT OF RESEARCH NEEDS AND PRIORITIES 1 (Edwin L. Civerolo et al. eds., 1993) (noting that the USDA sponsored this workshop for scientists, agency representatives and industry representatives from June 29- July 1, 1993) [hereinafter ALTERNATIVES WORKSHOP].

30. *Id.* at 1.

31. *Id.*

32. 40 C.F.R. § 166.1 (1995) (providing exemptions for limited use of certain restricted pesticides as authorized by § 18 of the Federal Insecticide Fungicide and Rodenticide Act (FIFRA)).

33. PEST. & TOXIC CHEM. NEWS (CRC), Mar. 24, 1993, *available in* Westlaw, 1993 WL 2758476.

lettuce and spinach,[34] and for growing watermelons and sweet potatoes.[35] None of these applications are registered uses of methyl bromide, but because of its efficacy as a pesticide the EPA permits these uses. As there are still no well-developed alternatives to methyl bromide and demand has not abated, it continues in widespread use in the United States.

Agriculture and food related industries used sixty-four million pounds of methyl bromide in 1990.[36] Soil fumigation applications accounted for the majority of use at forty-four to forty-nine million pounds.[37] Approximately five million pounds were used for post-harvest and quarantine applications. Four to nine million pounds were used in fumigating structures and containers and the remaining six million pounds were used in manufacturing processes as an intermediate compound.[38] Overall use in the U.S. has begun to decline, though, making the economic necessity of methyl bromide less significant. One source estimated that current annual agricultural use has fallen to forty-three million pounds per year.[39] Although that figure still represents a significant amount of methyl bromide use, it does indicate that the chemical may not be as vital as the USDA advocates first believed.[40] Nonetheless, methyl bromide is still the sixth most widely used agricultural pesticide in the United States.[41]

In addition to conventional uses for food production, processing and shipment, methyl bromide is used in a wide variety of other pest control applications. For example, all brassware imported to the U.S. from India must be fumigated with methyl bromide.[42] The USDA requires this treatment to prevent introduction of the khapra beetle, a serious grain pest, that can be transported with brassware.[43] One source suggested that fumigating brassware from India accounted for ten percent of the U.S. methyl bromide fumigation consumption for 1993.[44] The U.S. also requires

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34. PEST. & TOXIC CHEM. NEWS (CRC), Mar. 29, 1993, *available in* Westlaw, 1994 WL 2524167.

35. PEST. & TOXIC CHEM. NEWS (CRC), Mar. 22, 1993, *available in* Westlaw, 1995 WL 8217613.

36. Craig Osteen, *Uncertain Future for Methyl Bromide*, AGRIC. OUTLOOK, July 1993, at 23.

37. *Id.*; *see also* Taylor, *supra* note 6, at 255 (reporting that soil fumigation in North America accounted for forty-four percent of the world methyl bromide consumption in 1990).

38. *Id.*

39. Ira Breskin, *Bromine Makers Cheer as Derivatives Business Warms*, CHEM. WK., Nov. 30, 1994, at 40 (noting that conventional uses such as methyl bromide are declining while other derivative uses, such as flame retardants and water treatment additives, are increasing).

40. GAO REPORT, *supra* note 7, at 14-15 (reporting USOA studies on Florida and California crops that require methyl bromide for successful yields).

41. Christine Blank and John Leidner, *What Will We Do Without Methyl Bromide?*, PROGRESSIVE FARMER, June 1995, at 24 (discussing U.S. agricultural uses, both in production and in export, for methyl bromide).

42. 7 C.F.R. § 319.75-4 (1994) (listing all restricted articles that the USDA Animal and Plant Health Inspection Service (APHIS) requires to be fumigated before release from import quarantine).

43. Khapra Beetle; Brassware and Wooden Screens from India, 60 Fed. Reg. 35,712 (1995) (to be codified at 7 C.F.R. § 319) (providing the background on the requirement for methyl bromide fumigation). This rule proposes to do away with the fumigation requirement because of changes in storage and pest control in India, reducing the risk of khapra beetle infestation. *Id.*

44. *Id.* This 1993 use accounted for 37,800 pounds of methyl bromide at a cost to importers of $275 per fumigation treatment.

methyl bromide fumigation for imported wood and lumber products as well as bulbs and rootstock.[45] For example, the U.S. Animal and Plant Health Inspection Service (APHIS) requires that imported logs harvested in Chile and New Zealand must be fumigated with methyl bromide within forty-five days of cutting.[46] That fumigation must be done inside the same sealable shipping container or cargo hold in which the lumber is shipped to the United States.[47] As roughcut logs do not retain much, if any, methyl bromide,[48] and there is no direct human contact with the finished lumber products, the risk of contamination is insignificant. However, the used methyl bromide will still be released into the atmosphere, carrying its own amount of environmental risk. Although these treatments do not account for as much of the methyl bromide use as soil fumigation, they still present problems to the environment.

Soil fumigation using methyl bromide is the largest source of atmospheric releases, and poses the most significant problems for continued use. Identified disadvantages to using methyl bromide as a soil fumigant include: (1) high toxicity and volatility; (2) reduction of soil biodiversity; (3) formation of bromide residues in the soil which is problematic for certain crops and countries; (4) air pollution; (5) water contamination (particularly in areas with high water tables); and (6) lack of proper disposal methods for plastic (i.e., tarps) used during fumigation process.[49] Methyl bromide use in production agriculture is criticized because its application does not lend itself to sustainable production practices.[50] For example, when it is used as a soil fumigant, it kills everything in the soil — pests as well as beneficial organisms such as earthworms that aerate soil and break down organic matter, mycorrhizal bacteria that fix nitrogen, and other beneficial scavengers.[51] This elimination of beneficial organisms is problematic because it leads to continued dependence on pesticides. As the natural balance of predators, prey and scavengers is upset in the soil after methyl bromide treatment, the treated soil is an attractive environment for new or recurring pests. Even if the producer rotates crops that do not host the same types of pests, the absence of beneficial organisms can be as detrimental to a good yield as the presence of a pest. Without the beneficial organisms to break down organic matter or fix nitrogen, the yield can be significantly reduced.

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45. Taylor, *supra* note 6, at 254.

46. Bob Flynn, *Filling the Wood Gap: U.S. Buyers Look Worldwide*, WOOD TECH., Sept. 1994, at 34 (discussing new proposed APHIS regulations for imported lumber products).

47. *Id.* The regulation also requires that such logs be heat treated upon arrival in the United States to insure that any remaining pests are killed.

48. Taylor, *supra* note 6, at 254 (describing the chemical reactions and desorption of methyl bromide when used to fumigate various products).

49. UNITED NATIONS, MONTREAL PROTOCOL'S METHYL BROMIDE TECHNICAL OPTIONS COMMITTEE (MBTOC), MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER, 1994 REPORT OF THE MONTREAL PROTOCOL'S METHYL BROMIDE TECHNICAL OPTIONS COMMITTEE 1995 ASSESSMENT 67-68 (1995) [hereinafter MBTOC].

50. ROSTOV AND SCHOENFIELD, *supra* note 6, at 1.

51. *Id.*

Further adding to the criticism, the use of methyl bromide allows producers to grow crops that would otherwise be impractical in certain environments. Due to the constant presence of certain pests and environmental conditions, some areas cannot be used for growing certain crops. By using methyl bromide, however, those pests can be eliminated and the crops grown successfully. An example of this practice is the production of peppers in Florida. Until growers began using methyl bromide to fumigate the soil, it was impractical to grow peppers in Florida.[52] The USDA reports that eighty-five percent of the pepper acreage in Florida is fumigated with methyl bromide and estimates a total yield loss of ninety percent if methyl bromide is banned.[53] Peppers grown in California, however, do not rely on methyl bromide to the same degree because of differing climatic conditions and pest populations. In California, the USDA reports that only two and one-half percent of the pepper acreage is treated with methyl bromide.[54] Because the peppers can be grown without methyl bromide (and without methyl bromide's potential health and environmental harms) in California, some contend that peppers should not be grown in Florida because of the indigenous pest pressures.[55]

III. Methyl Bromide and Health Risks

Available research indicates methyl bromide is a potent substance to human health, both directly and indirectly. Methyl bromide can cause severe health problems and death in a variety of means, including toxic effects upon exposure, rapid depletion of the ozone, and carcinogenic properties. Research studies on the negative human health effects of methyl bromide are based on largely anecdotal evidence, but scientists and doctors do understand the toxic effects on humans.[56]

Methyl bromide intoxication causes a range of medical problems when humans are exposed. Much of the medical research comes from accidental exposures or incidents where persons did not realize they were in contact with methyl bromide.[57] Intoxication effects are classified into three medical phases.[58] Persons exposed to methyl bromide first may experience dimmed vision, staggering gait, headaches, nausea, delirium or syncope.[59] The next phase includes muscle twitching,

52. NAPIAP REPORT, *supra* note 6, at 31 (noting that "the availability of a reliable pre-plant soil fumigant, such as methyl bromide, has been a critical factor").

53. *Id.* at 25.

54. ROSTOV & SCHOENFIELD, *supra* note 6, at 3 (citing NAPIAP REPORT, *supra* note 6, at 56).

55. *Id.*

56. Marraccini et al., *supra* note 19, at 601-02; *see also Illness Associated with Soil Fumigation*, MORBIDITY & MORTALITY WK. REP., June 22, 1974; C.H. Hine, *Methyl Bromide Poisoning — A Review of Ten Cases*, 11 J. OCCUPATIONAL MED. 1-10 (1969); H. Wyers, *Methyl Bromide Intoxication*, 2 BRIT. J. INDUS. MED. 24-29 (1945).

57. Marraccini et al., *supra* note 19, at 602-605 (discussing the medical effects in both lethal and nonlethal cases of methyl bromide intoxication). Much of the data for this article came from Florida, where Methyl Bromide was commonly used to fumigate homes for pests. The entire home would be "tented" and then filled with MeBr. In some instances, the Methyl Bromide leaked from the treated home and in other instances burglars broke into treated homes. *Id.*

58. *Id.* at 605 (citing H. Wyers, *Methyl Bromide Intoxication*, 2 BRIT. J. INDUS. MED. 24-29 (1945)).

59. Marranccini et al., *supra* note 19, at 605.

convulsions, mania, trismus, and respiratory failure.[60] The third phase of methyl bromide intoxication is either death or a slow recovery plagued with other health problems. Should the person survive the poisoning, recovery may include hallucinations, apathy, amnesia, aphasia, ataxia, sensory defects, tremors and recurrent seizures.[61] Other symptoms of methyl bromide poisoning include kidney and liver failure, psychoneurotic effects, and visual impairment.[62] Finally, evidence now points to methyl bromide as a possible carcinogen.[63]

As a toxicant to humans, methyl bromide clearly has severe potential. Although its high volatility usually means that little to no residue remains on food materials,[64] the high concentration used for fumigation and the density of methyl bromide still present a risk to human health. Even if U.S. consumers face little risk of contamination from food sources, whether domestic or imported, the extremely toxic nature of methyl bromide should create concern for those who apply the material. This risk to workers exists in the U.S.,[65] but it is especially problematic for workers in developing countries where literacy and basic understanding of warning labels may be lacking. The potential for poisoning in developing countries is increased because secure containment facilities are usually not available.[66] Methyl bromide fumigation may take place under a tarp held down with rocks or in reused steel barrels, making the possibility of contamination even greater.

Besides its direct impact on human health, methyl bromide presents another health risk because it severely damages the stratospheric ozone layer.[67] Methyl bromide has an ozone depleting potential (ODP) of 0.6 to 0.7, depending on which study is consulted.[68] Much of the initial concern about methyl bromide destruction of the ozone layer came from the increased use of methyl bromide.[69] From 1984 to 1990, worldwide sales of methyl bromide increased from 45.6 thousand tons to 66.6 thousand tons.[70] The rapid increase was attributed almost entirely to increased

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60. *Id.*

61. *Id.*

62. *Id.* at 605-06.

63. *See, e.g., OSHA Identifies Potential Carcinogens as Candidates for Rule on Exposure Limits*, NAT'L ENV'T DAILY (BNA) No. 205, Oct. 26, 1994, at 7 (outlining proposed rule from OSHA to revalidate permissible exposure limits for known carcinogens that had been vacated by 1992 federal court order); Judy Rice, *Controlled Atmosphere Sea Vans Save Millions*, 55 FOOD PROC. 29, 30 (1994) (discussing recent innovations by U.S. Defense Dept. to ship produce to Guam without using methyl bromide, which is suspected of having carcinogenic properties).

64. T. Dumas, *Inorganic and Organic Bromide Residues in Foodstuffs Fumigated with Methyl Bromide and Ethylene Dibromide at Low Temperatures*, 21 J. AGRIC. FOOD CHEM. 433-36 (1973).

65. *See, e.g.*, Cattell v. Great Lakes Chem. Corp., 1995 U.S. Dist. LEXIS 5606 (D.N.J. 1995) (dismissing a lawsuit filed by a worker who was not aware of amended methyl bromide label instructions for worker protection measures).

66. Kablack, *supra* note 10, at 284-85 (listing the factors that contribute to higher rates of pesticide poisoning in less developed countries).

67. 58 Fed. Reg. 65,018 (1993); 58 Fed. Reg. 69,235 (1993).

68. Taylor, *supra* note 6, at 255-56 (discussing various scientific ozone studies that document the damage caused by methyl bromide).

69. *Id.* at 255 (discussing methyl bromide in relation to ozone depletion).

70. *Id.*

use as a soil fumigant, as post-harvest storage and quarantine uses stayed nearly constant over the same time span.[71] Because methyl bromide is a relatively reactive chemical, the amount applied for fumigation is usually greater than the amount released into the atmosphere.[72] Nonetheless, an increased use of more than twenty thousand tons of methyl bromide during six years could have a significant effect on the ozone layer, even if only a percentage of the applied fumigant is actually released.

IV. United States Regulation of Methyl Bromide

Methyl bromide is classified as a "restricted use pesticide," meaning that it can only be purchased and used by certified pesticide applicators.[73] It is also subject to the EPA registration regime; a regulatory process that requires certain studies and data be made available to the EPA before the pesticide can be sold.[74] In its simplest terms, the EPA pesticide registration procedure is a balancing process: the EPA allows the pesticide to be sold if the benefits outweigh the costs and the risks of harmful health are negligible. The EPA also lists methyl bromide as a Class I Acute Toxin, the most severe rating it uses for chemical compounds.[75] Under California law, methyl bromide is classified as a reproductive toxicant because of its teratological and mutagenic effects.[76]

Although the direct human health effects of methyl bromide are well documented, it was the recent evidence about methyl bromide as an ozone-destroying agent that lead to its regulation. In 1992, the parties to the Montreal Protocol agreed to list methyl bromide as an ozone-depleting substance.[77] As part of that international convention, the parties also agreed that beginning in January 1995, production levels for methyl bromide should be held to 1991 levels or lower.[78] This freeze on production levels included a special exemption for developing countries and for use in quarantine and preshipment applications.[79] These exemptions were intended to minimize the economic effects of reducing the availability of methyl bromide.

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71. *Id.*

72. *Id.*; *see also* Andrew J. Jessup et al., *Residues of Methyl Bromide and Inorganic Bromide in Fumigated Produce*, 42 J. AGRIC. FOOD CHEM. 108, 109-110 (1994) (discussing results of research testing for residue of methyl bromide when used to fumigate produce in sealed containers).

73. 40 C.F.R. § 152.175 (1995). Certified pest applicators must attend a specified course of study, pass certification examinations, and maintain certain continuing education requirements.

74. Federal Insecticide Fungicide and Rodencide Act (FIFRA), 7 U.S.C. §§ 136(z), 136a (1994) [hereinafter FIFRA] (outlining requirements and procedures for pesticide registration); *see also* MCKENNA AND CUNEO & TECHNOLOGY SERVS. GROUP, INC., PESTICIDE REGISTRATION HANDBOOK 31-86 (3d ed. 1993) (detailing the EPA pesticide registration procedure).

75. See ALLEN ET AL., *supra* note 6 at 5.

76. CAL. CODE REGS. tit. 22, § 12000 (1994). Teratological effects refer to birth defects and mutagenic effects refer defects which are inheritable.

77. GAO REPORT *supra* note 7, at 3.

78. *Id.*

79. *Id.*

All of the Montreal Protocol restrictions on methyl bromide were adopted as nonbinding resolutions pending further investigation.[80] In December 1995, the parties convened the Seventh Meeting to undertake specific binding reductions in ozone-depleting substances.[81]

As a party to the Montreal Protocol, the United States agreed to these restrictions.[82] However, the Clean Air Act[83] added another dimension to regulation of methyl bromide. Under the Clean Air Act, any substance with an ODP greater than 0.2 must be withdrawn from production within seven years.[84] On that basis, the EPA implemented a regulation to phase out methyl bromide production entirely by the year 2001.[85] The EPA also set production and consumption allowances for producers and users of methyl bromide.[86]

The decision by the U.S. EPA to phase out methyl bromide quickly came under attack. The EPA had not consulted with the USDA about possible implications for the U.S. agricultural industry, so the USDA was among the first to react to the ban. Part of the USDA reaction was exemptions for continued use and production of methyl bromide in the United States.[87]

The USDA began by questioning the scientific background that the EPA relied on for its decision.[88] The USDA scientists indicated that the initial value assigned to methyl bromide for its ozone depletion value could be significantly lower.[89] In its criticism of the EPA action, the USDA focused on four major uncertainties.[90] First, the USDA scientists felt further research is needed on the comparative contri-

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80. *Id.* at 9.

81. Resolution Adopted by the Parties to the Montreal Protocol on Substances That Deplete the Ozone: Methyl Bromide, Annex 15, Fourth Meeting (1992). The text reads:

> Resolve in the light of serious environmental concerns raised in the scientific assessment, to make every effort to reduce emissions of and to recover, recycle and reclaim methyl bromide. [The parties] look forward to receiving the full evaluations to be carried out by the UNEP Scientific Assessment Panel and the Technology and Economic Assessment Panel, with a view to deciding on the basis of these evaluations no later than at the Seventh Meeting, in 1995, a general control scheme for methyl bromide, as appropriate, including concrete targets . . . .

Id.

82. Protection of Stratospheric Ozone, 58 Fed. Reg. 65,018, 65,019 (1993) (describing background to EPA final rule adding methyl bromide to list of Class I substances under § 604 of the Clean Air Act).

83. 42 U.S.C.A. §§ 7401-7671q (West. 1995).

84. *Id.* § 7671c(a), (b) (providing phaseout and eventual termination of substances that deplete the ozone).

85. 40 C.F.R. § 82.1 (1995); 58 Fed. Reg. 15,014 (Mar. 18, 1993)

86. Protection of Stratospheric Ozone, 58 Fed. Reg. 69,235, 69,238 (1993) (to be codified at 40 C.F.R. §§ 82.5, 82.6) (setting baseline production for Great Lakes Chemical Corporation and Ethyl Corporation and consumption allowances for several distributors).

87. GAO REPORT, *supra* note 7, at 9-10 (highlighting importance of methyl bromide for emergency pest control).

88. *See* Elizabeth Kirschner, *Industry, USDA Say EPA Jumped the Gun on Methyl Bromide Phaseout*, CHEM. WK., May 26, 1993, at 48 (discussing criticisms directed at the EPA decision to phase out methyl bromide and the agency's underlying scientific evidence).

89. *Id.* (quoting USDA environmental toxicologist Willis Wheeler).

90. Osteen, *supra* note 36, at 25.

butions of methyl bromide from natural versus anthropogenic sources.[91] Some evidence from the USDA shows that natural sources may be a significant source of atmospheric methyl bromide.[92] Second, the USDA scientists requested a complete quantification of possible reaction changes that methyl bromide undergoes once it is in the atmosphere. For example, studies show that methyl bromide degrades under some circumstances to hydrogen bromide (HBr), a stable and nondestructive form of bromine.[93] USDA scientists argued that the EPA had no conclusive data showing how much methyl bromide degrades in the atmosphere. Third, the USDA scientists sought more extensive data on the persistence of methyl bromide in the atmosphere.[94] This contingent believed studies should be conducted to determine the relative lifetime of methyl bromide, percentage dissipated and other reactions that methyl bromide undergoes.

Finally, the USDA scientists also wanted further information on the amount of methyl bromide that actually stems from agricultural sources in the U.S.[95] Anthropogenic sources of methyl bromide are acknowledged, but the USDA scientists noted that the oceans release methyl bromide and extensive burning contributes methyl bromide.[96] Other scientific studies question the sources and relative contributions of the methyl bromide detected in the upper atmosphere.[97]

The USDA considers methyl bromide indispensable from an economic standpoint. When the EPA first proposed completely phasing out the use of methyl bromide by the year 2000, the USDA estimated that producers and consumers would lose $1.3 to $1.5 billion annually if methyl bromide were not available for agricultural uses.[98] Those estimated losses would not begin until the year 2000 if the EPA did not phase out methyl bromide but instead only began the complete ban in that year.[99]

The USDA further criticized the EPA decision because the agency only used the Clean Air Act machinery to propose phasing out methyl bromide.[100] Instead, the USDA charged that the EPA should have used some form of cost-benefit balancing as it does under federal pesticide registration regulation.[101] Although no exact

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91. RESEARCH AGENDA, *supra* note 7, at 2 (requesting revised research program to study sources of methyl bromide).

92. *Id.*

93. Osteen, *supra* note 36, at 25.

94. *Id.* (noting that the chemical life cycle of MeBr in the atmosphere is not completely documented).

95. *Id.*; *see also* RESEARCH AGENDA, *supra* note 7, at 8-9 (providing details for further emission research on methyl bromide).

96. Osteen, *supra* note 36, at 25.

97. Ralph J. Cicerone, *Fires, Atmospheric Chemistry, and the Ozone Layer: Biomass Fires Produce Large Amounts of Methyl Bromide*, 263 SCIENCE 1243 (1994) (discussing other sources of atmospheric methyl bromide and noting the lack of empirical evidence to estimate the amount of MeBr that escapes from soil fumigation); Stein Mano and Meinrat O. Adreae, *Emission of Methyl Bromide from Biomass Burning*, 263 SCIENCE 1255 (1994) (presenting results from recent atmospheric study suggesting that biomass burning contributes as much MeBr to the atmosphere as ocean emission and pesticide use).

98. Osteen, *supra* note 36, at 22.

99. *Id.*

100. *Id.*

101. *Id.*

statutory or regulatory language exists mandating how conflicts between the Clean Air Act and FIFRA should be resolved, the USDA conversely failed to point out any mandatory balancing provisions either. However, using an economic-based approach with the costs and benefits included may have eased the transition and helped focus research directions for methyl bromide alternatives.[102]

The Clean Air Act does provide a mechanism for developing and implementing alternatives to ozone-depleting substances. Section 612 of the amended Clean Air Act of 1990 sets forth a Significant New Alternatives Policy (SNAP) program.[103] The SNAP program authorizes the EPA to identify the use of substitutes that carry less risk for human health and environmental quality.[104] Although this program is functioning for other ozone-depleting substances,[105] the EPA has not yet completed its evaluation of pesticide alternatives. Fending off any challenges to the methyl bromide ban would be much easier if the EPA had completed its SNAP evaluations and could present viable substitutes.

U.S. producers of methyl bromide joined the criticism of the EPA decision to phase out methyl bromide, citing their potential economic losses from sales of methyl bromide.[106] However, the EPA has allowed U.S. manufacturers to continue production at baseline levels. This decision permits companies with a record of producing methyl bromide in 1991 to continue producing at that same level.[107] Additional allowances are permitted for purposes of meeting export demand to article 5 developing countries.[108]

In spite of allowed continued methyl bromide production, the producers still seek to have the ban weakened. In a recent letter to agricultural users, the director of the Methyl Bromide Working Group suggested that the domestic ban may be reduced to allow continued methyl bromide production.[109] The letter stated that there is "an increasingly good chance of being able to use methyl bromide well beyond the year 2001."[110] Despite this optimism, the letter also states that the EPA may attempt to have the Montreal Protocol amended to limit production by twenty-five percent by

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102. Protection of Stratospheric Ozone, 60 Fed. Reg. 31,092 (1995) (to be codified at 40 C.F.R. § 82.1) (discussing EPA guidelines, including overall risk to human health and the environment, for evaluating alternatives to ozone-depleting substances).

103. 42 U.S.C.A. § 7671k (West 1995). Note that this section mandates the EPA to consult with other relevant federal agencies, such as the USDA. *Id.* § 7671k(b)(2).

104. Protection of Stratospheric Ozone, 59 Fed. Reg. 13,044 (1994).

105. *See, e.g.*, Protection of Stratospheric Ozone; Acceptable Substitutes for the Significant New Alternatives Policy (SNAP) Program, 60 Fed. Reg. 38,729 (1995) (listing suitable alternatives for ozone-depleting substances used in refrigeration, air conditioning, fire suppression, and medical sterilants).

106. Kirschner, *supra* note 88, at 49.

107. Protection of the Stratospheric Ozone, 58 Fed. Reg. 69,235 (1993) (establishing the baseline production and consumption allowances for methyl bromide).

108. *Id.* at 69,239.

109. *Environmentalists Release, Denounce Industry Group Letter on Methyl Bromide*, NAT'L ENV'T DAILY (BNA) No. 38, Feb. 27, 1995, at 9 [hereinafter *Environmentalists Denounce Industry Group Letter*] (noting that Friends of the Earth and Ozone Action had released a letter sent from Peter Sparber, director of the Methyl Bromide Working Group, sent to large-scale agricultural users of methyl bromide).

110. *Id.* (quoting the letter from the Methyl Bromide Working Group).

1998.[111] This added restriction would cut into the currently allowed production levels, frozen at 1991 levels until 2001. Parties to the Montreal Protocol are scheduled met Vienna in late 1995.

The letter continued in a conspiratorial tone, warning methyl bromide users that the EPA would enforce the methyl bromide ban if there are viable alternatives available or "if the agency decides that your use of methyl bromide is unimportant."[112] The letter cautions users to be careful about what they publicly say about methyl bromide and suggests that a tax could be levied on methyl bromide production "[e]ven with a Republican Congress."[113] The Working Group mentions the possibility of a tax of $3.75 per pound, with yearly increases.[114] Given that the current price for methyl bromide is approximately $0.77 per pound,[115] this tax could make revenue returns much different for producers.[116] The existence of the letter is evidence of the mounting pressure to undo current regulatory efforts. In the face of the international ban on methyl bromide and the even more stringent domestic regulation, the industry continues to see methyl bromide production as an important revenue source.[117]

When questioned about the letter and its intent, the director of the Methyl Bromide Working Group responded by pointing out that methyl bromide is still used on more than 100 crops domestically.[118] The continuing need for methyl bromide is also justified by the lack of suitable alternatives for methyl bromide and the long, costly process to register new compounds with the EPA.[119] The group also con-

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111. *Id.* The parties did meet and adopted a weakened phaseout, with a final expiration scheduled for 2100. *See* UNITED NATIONS ENVIRONMENTAL PROGRAMME, REPORT OF THE SEVENTH MEETING OF THE PARTIES TO THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER (Dec . 27, 1995) (UNEP/OzL.Pro.7/12).

112. *Environmentalists Denounce Industry Group Letter*, *supra* note 109.

113. *Id.*

114. *Id.* The letter suggests Congress may impose a tax of $3.75 per pound of Methyl Bromide produced. Nothing in the letter reflects basic concepts of producer surplus economics, such as suggesting that the tax could be passed on to consumers or that producers should prefer the economic implications of regulation over taxation.

115. *Methyl Bromide Producers, Demand, Prices and Uses*, CHEM. MARKETING REP., Jan. 3, 1994, at 37.

116. Taxing production of methyl bromide and hydrochlorofluorocarbons, both of which are scheduled for bans, could generate up to $1.6 billion over five years according to a study by the Friends of the Earth based on figures released by the Congressional Joint Committee on Taxation. *Group Charges Tax Code with Favoring Biggest Polluting Industries in U.S.*, NAT'L ENV'T DAILY (BNA), Apr. 14, 1995 No. 72, at 5.

117. Breskin, *supra* note 39, at 40 (stating that methyl bromide makers can "easily eliminate methyl bromide production by making a small capital investment, [but] they are loathe to do so because they stand to lose incremental revenue").

118. *Id.* Some criticize this figure, though, because although methyl bromide may be used on 100 crops, that does not mean that all of those crops are grown with methyl bromide or that methyl bromide is required to grow the crop. ROSTOV & SCHOENFIELD, *supra* note 6, at 3.

119. *See* GAO REPORT, *supra* note 7, at 11 (estimating that Note that nonchemical alternatives to methyl bromide and existing chemical compounds would not be subject to the "complicated [and] lengthy" EPA registration process. *See* GAO REPORT, *supra* note 7, at 11 (estimating that developing a new pesticide could take up to 10 years at a cost of $50 million to $70 million).

tends that the alternatives discussed by environmental advocates are not widely available and are largely ineffective.[120]

Furthermore, Rep. Dan Miller (R.-Fla.) recently introduced a bill that would restrict the EPA authority to control the production, importation, and export of methyl bromide.[121] The bill seeks to undo the EPA phaseout and 2001 ban of methyl bromide by taking away any regulatory authority under the Clean Air Act.[122] Instead, the bill only allows the EPA to regulate methyl bromide if the Secretary of the USDA certifies that there are viable, cost-effective alternatives available.[123] Finally, the bill does not purport to abrogate any U.S. obligations under the Montreal Protocol. It specifies that the EPA may regulate methyl bromide to comply with the requirements of the Montreal Protocol only.[124] Pending the outcome of the Seventh Meeting of the Montreal Protocol in December 1995, that authority may be nonexistent.

Even though the EPA classified methyl bromide as a Class I ozone depleting substance under its rule-making procedure and in accordance with Montreal Protocol requirements, that classification is now subject to litigation. As is often the case, the government action pleased neither the environmental groups nor the industrial producers and commercial users. Neither side is satisfied with the EPA's rule on classification of methyl bromide, and both groups have filed lawsuits seeking review of the final EPA rule.[125]

The Natural Resources Defense Council (NRDC) filed a lawsuit challenging certain aspects of the EPA's procedure on the final rule.[126] Under the Clean Air Act, products that contain or are "manufactured" with methyl bromide are supposed to carry a label indicating that information.[127] The rationale for this label requirement is that consumers and the market will drive the initiative to find alternatives to ozone-depleting substances such as methyl bromide.[128] With a label on the product, consumers could make the decision to not buy a product manufactured with the ozone-depleting substance or buy a competing product manufactured without ozone-depleting substances. The consumer demand would then provide the econom-

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120. *Id.*

121. H.R. 2230, 104th Cong., 1st Sess. (1995). The majority of co-sponsors of the bill are representatives from regions where methyl bromide is used extensively, such as California, Texas, and North Carolina. *Id.*

122. *Id.* § 2.

123. *Id.* § 2(C). This action returns the USDA to a position of authority in the methyl bromide controversy, even though the USDA has no regulatory authority under the Clean Air Act.

124. *Id.* § 2(D).

125. *Supreme Court Cases Top Long List of Environmental Litigation in 1995*, NAT'L ENV'T DAILY (BNA) No. 19, Jan. 26, 1995, at 3 (discussing both lawsuits filed against EPA seeking review of its final rule classifying MeBr as a Class I ozone depleter).

126. Natural Resources Defense Council v. U.S. Environmental Protection Agency, C.A .D.C., No. 94-1079, filed Feb. 8, 1994.

127. 58 Fed. Reg. 236 (1993); 42 U.S.C.A. § 7671j(d)(1) (West 1994).

128. *Labeling Provisions in Clean Air Act Challenged by NRDC, Friends of the Earth*, NAT'L ENV'T DAILY (BNA) No. 28, Feb. 11, 1994, at 8 (describing reasoning for the label requirement) [hereinafter *Labeling Provisions*].

ic incentive for producers to find and use alternatives to the ozone-depleting substance.

In the case of methyl bromide, environmental groups believed this regulation would necessitate labels on food products that had been grown or treated with methyl bromide. However, agricultural industry representatives argued the labeling requirement would be highly impracticable and burdensome.[129] The EPA agreed with the agricultural industry, contending that "manufacture" did not include food production and processing.[130] The EPA explicitly recognized the supposed difficulty in labeling food products, stating in the preamble to the rule that product labeling under section 611 of the Clean Air Act "raises issues that Congress did not foresee in enacting [the law]. For example, applying the labeling provision to agricultural products for which methyl bromide is used is practically more difficult than labeling of most manufactured products."[131] The NRDC believed this interpretation runs counter to the intent of section 611 of the Clean Air Act.[132]

The Western Growers Association, a production group, is challenging the same rule alleging that methyl bromide has not been proven as an ozone-depleting substance.[133] The basis of this complaint is that the EPA has not fully considered all available scientific studies in its decision to phase out methyl bromide. This action has been consolidated with the NRDC action, and is currently awaiting further EPA responses. These lawsuits may become moot should Congress take further action on the Miller Bill to strip EPA's regulatory authority over methyl bromide.

The EPA tacitly acknowledges the economic importance of methyl bromide by granting section 18 exemptions for methyl bromide users.[134] Under section 18 of Federal Insecticide Fungicide and Rodenticide Act (FIFRA),[135] the EPA Administrator may permit use of a registered pesticide for an unregistered use if certain conditions are met.[136] As required in FIFRA, registered pesticides may only be used for particular uses specified in the pesticide's registration process.[137] An application for an unspecified use is illegal, unless a section 18 exemption is obtained from the EPA.[138] Specific exemptions are authorized in an emergency condition if use is necessary to avert significant economic losses or significant risk to endangered species, threatened species, beneficial organizations, or the environment.[139] Quarantine exemptions are available for situations when a new pest appears that may have the

129. *Id.*

130. *Id.*

131. 58 Fed. Reg. 236 (1993).

132. *Labeling Provisions*, *supra* note 128, at 8. Turner Odell, attorney for NRDC, noted that "nine out of ten produce items" purchased already carry some form of label or sticker, so the alleged burden to producers and processors is overstated in the NRDC's opinion. *Id.*

133. Western Growers Association v. U.S. Environmental Protection Agency, C.A. D.C., No. 94-1077.

134. *See infra* notes 135-142 and accompanying text.

135. 7 U.S.C. §§ 136-136y (1994).

136. 40 C.F.R. § 166.1 (1995).

137. 7 U.S.C. § 136b (1994).

138. 7 U.S.C. § 136b(a)(2) (1994).

139. 40 C.F.R. § 166.2(a) (1995).

threat of widespread damage.[140] Either type of exemption requires that the person requesting it provide field test data that registered pesticides are ineffective and that the proposed exempted pesticide will be effective.[141]

Although the health and environmental effects of methyl bromide are documented, the EPA continues to grant quarantine and specific exemptions for methyl bromide. The EPA apparently acknowledges the mixed signals in its regulatory approach. In at least one of its recent quarantine exemptions to permit methyl bromide to control thrips and aphids on lettuce, celery, spinach, broccoli and cauliflower, the EPA noted that quarantine exemptions only account for 1% of total methyl bromide use.[142] The EPA statement also mentions the eventual phaseout of methyl bromide and encourages the growers using methyl bromide to look for alternative pest control measures.[143]

Litigation involving the human health effects of methyl bromide is extremely limited. To date, only one reported case involves the harmful health effects of meth yl bromide. In *Cattell v. Great Lakes Chem. Corp.*[144] a fumigator for Western Termite and Pest Control alleged that mislabeled methyl bromide caused his health problems. Although this case was reported for the FIFRA preemption issue, it is noteworthy to examine the facts leading to the plaintiff's injuries. It indicates that even when applicators are equipped with moderate safety equipment, methyl bromide presents a significant health threat.[145]

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140. *Id.* § 166.2(b). Note also that § 18 authorizes public health exemptions (significant pest risk to human health) and crisis exemptions (authorized when there is not sufficient time to document the necessary elements for a specific, quarantine or public health exemption). *Id.* § 166.2(c), (d).

141. *Id.* § 166.20(a).

142. *Section 18 Specific, Quarantine Exemptions Granted by EPA*, PEST. & TOXIC CHEM. NEWS, Mar. 9, 1994, *available in* Westlaw, 1994 WL 2524167.

143. *Id.*

144. Civ. A. No. 94-1243 (JEI), 1995 U.S. Dist. LEXIS 5606 (D.N.J. Apr. 21, 1995).

145. The plaintiff, Kenneth Cattell, began using methyl bromide in 1979 in his position as an exterminator with Western Termite and Pest Control. *Id.*, 1995 U.S. Dist. LEXIS 5606, at *2. During this time, the label attached to the methyl bromide containers indicated that applicators should use full-faced canister-type gas masks. This recommendation was repeated to Cattell when he attended a training session sponsored by Great Lakes Chemical Corporation, the methyl bromide manufacturer. At the 1983 training session for exterminators using methyl bromide, Great Lakes representatives informed applicators that they should use the canister-type gas masks.

In 1986, with EPA approval, Great Lakes changed the label on the methyl bromide to inform applicators that more protective breathing systems should be used whenever the concentration of methyl bromide exceeded five parts per million. Instead of the canister-type gas masks, applicators were to use "self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirators or leave the area [of fumigation]." *Id.*, 1995 U.S. Dist. LEXIS 5606, at *4 (quoting the revised Great Lakes label on methyl bromide containers). For reasons not disclosed in the opinion, plaintiff Cattell was not aware of or did not read the label change. He continued fumigating with methyl bromide, using only the canister-type gas mask instead of the label-recommended self-contained breathing device with its own air supply. In 1988 Cattell attended another Great Lakes training session, where he learned he should be using a better type of breathing device for methyl bromide fumigations. After the 1988 training session, Cattell did use the self-contained breathing apparatus when he worked with methyl bromide.

However, in December 1991 Cattell began feeling tingling sensations in his arms and legs. Note that these are similar to the symptoms described in the medical reports. *See* Marraccini et al., *supra* note 19,

On a motion for summary judgment by Great Lakes, the U.S. District Court of New Jersey dismissed Cattell's claim based on the preemptive effects of FIFRA. The court found that FIFRA preempted any common law tort claims and any stat e "failure to warn" claims for mislabeled pesticides.[146] Although the serious health effects suffered by Cattell were at the heart of the case, neither his attorney nor the court *sua sponte*, discussed the other regulatory aspects of methyl bromide.

A. Policy Recommendations

The U.S. has already taken the initial steps to eliminate methyl bromide from production domestically. However, pending weaknesses in the ban must be eliminated. As noted above, the ban only extends to production of methyl bromide by the year 2001; use can be continued if the other imported methyl bromide can be secured. This possibility is slight, given the number of nations that are parties to the Montreal Protocol, but other pesticides are not subject to the Montreal Protocol as ozone-depleting substances. Further, lobbying efforts to undo the strength of the phaseout and ban are underway and may be successful, especially in light of the current deregulation tones of the U.S. Congress. In spite of these assaults on the methyl bromide phaseout, the EPA should take even more drastic steps to eliminate methyl bromide from production and use.

Further studies, as described, above may indicate that anthropogenic contributions of methyl bromide are not significant in ozone depletion.[147] However, the other human health effects of methyl bromide should be enough to follow through with the worldwide ban. The human health costs associated with methyl bromide intoxication are too great to allow continued use as a fumigant.

The United States is in the unique position of being able to lead the world away from continued production and use of methyl bromide. The difficulty that developing countries will have working without methyl bromide, as illustrated in the following discussion of Mexican regulations, make the role of the U.S. that much more vital. The example of methyl bromide may also be the impetus for a regional agreement on pesticides, similar to the Bamako Convention enacted by African nations.[148]

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at 605. By May 1992 he was confined to a wheelchair because of the nerve and muscle damage he experienced. In March 1994 Cattell sued Great Lakes, alleging that the company had not adequately warned him of the dangers of methyl bromide and failed to properly call attention to the 1986 label change. At trial, doctors who examined Cattell testified that he suffered from bromine poisoning resulting from the overexposure to methyl bromide while he worked. *Cattell*, Civ. A. No. 94-1243 (JEI), 1995 U.S. Dist . LEXIS 5606, at *5.

146. *Cattell*, Civ. A. No. 94-1243 (JEI), 1995 U.S. Dist. LEXIS 5606, at *26.

147. *See supra*, notes 88-98 and accompanying text.

148. Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes Within Africa, *adopted and opened for signature* Jan. 29, 1991, Organization of African Unity (OAU) [hereinafter Bamako Convention]. The Bamako Convention is unique in its approach to environmental protection for developing countries. *See* Margo Brett Baender, *Pesticides and Precaution: The Bamako Convention as a Model for an International Convention on Pesticides Regulation*, 24 INT'L L. & POL. 557 (1991) (proposing that the Bamako Convention, with the addition of stronger enforcement measures, would serve as an appropriate model for world-wide mul-

B. Historical Basis for Banning Methyl Bromide

The U.S. must also heed the lessons from the past when considering policy choices for methyl bromide. Recent history provides other examples of chemicals thought to be essential or indispensable, even though they carried tremendous health and environmental concerns. Producers and users maintained that modern chemistry could not produce adequate substitutes for the chemical in question. Producers and users also pointed to high economic reliance on the particular chemical as a reason that it should not be banned. Without the use of the particular chemical, entire industries would collapse, or at the very least, consumers would be forced to pay exorbitant prices for the end products. When faced with increasingly certain scientific data about the detrimental effects of the chemical, the producers and users continued to deny the validity of the science and the viability of alternatives. Nonetheless, when the U.S. government finally applied sufficient regulatory pressure, producers and users were able to find alternatives. Industries did not collapse and economic effects on end-use consumers have been negligible over time. Most importantly, by eliminating the chemical, the detrimental health and environmental effects were eliminated. Chemicals such as DDT and chlorofluorocarbons are examples of chemicals that played an important role in industry and were thought to be indispensable.[149] DDT and other organochlorine pesticides provide an vivid example of the U.S. regulatory system and its failure to act soon enough.[150]

DDT and the other organochlorine pesticides were initially developed because the scientific and regulatory communities found that the arsenic based insecticides were causing significant health problems in the 1920s and 1930s.[151] Farmers began using arsenate pesticides in 1870s, and soon after, medical authorities began reporting many more incidents of lead and arsenic poisoning.[152] By 1938 the federal government restricted use of the arsenate pesticides, which lead to widespread use of DDT and organochlorine pesticides by the late 1940s.[153] These pesticides had been further refined and increased in potency as a result of chemical research during World War II.[154]

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tilateral pesticide treaties). The focus of the Bamako Convention is a precautionary principle to environmental pollution: products and processes that have the potential of pollution are banned before the problem arises. *Id.* at 595-96. The Bamako Convention also bans certain pesticides from trade and subjects other pesticides to a rigorous PIC (prior informed consent) review and notification process. *Id.* at 598. *See also* Kablack, *supra* note 10, 291-295 (discussing other international efforts to reform pesticide regulation).

149. ALLEN ET AL., *supra* note 6, at 13-16.

150. *Id.* at 13-14; *see also* BOARDMAN, *supra* note 1, at 133-144 (discussing regulatory unevenness of pesticides in the international context).

151. ALLEN ET AL., *supra* note 6, at 14. The two common arsenic-based pesticides included lead arsenate and calcium arsenate. *Id. See generally* JAMES WHARTON, BEFORE SILENT SPRING: PESTICIDES AND PUBLIC HEALTH IN PRE-DDT AMERICA (1975) (describing early forms of pesticides used in American agriculture).

152. ALLEN ET AL., *supra* note 6, at 14.

153. BOARDMAN, *supra* note 1, at 31. Other commonly-used organochlorine pesticides included toxaphene, lindane, aldrin, dieldrin, chlordan, heptachlor, endrin and endosulfan. *Id.* at 33.

154. *Id.* at 31. Although DDT was first formulated in 1874, Britain and the U.S. rediscovered the

Commercial use and production of DDT in the U.S. began immediately after the end of the war, with agricultural agents recommending DDT for nearly any type of pest problem. With continued use and exposure, health and environmental problems lead to research on the other properties of DDT. Subsequent research driven by these health and environmental concerns revealed a variety of important problems with the chemical. Scientific studies and medical research found DDT had an extremely high level of toxicity in mammals.[155] Research also determined that DDT had a high level of stability and persistence in the environment.[156] Finally, entomology research indicated many insect pests were developing a complete resistance to DDT with continued exposure.[157]

After publication of Rachel Carson's *Silent Spring*[158], consumer and health advocate groups began asking the federal government to restrict use of DDT.[159] As the pressure to restrict or ban DDT grew, the producers and users of DDT began proportionately vocal campaigns extolling the virtues of DDT as a pesticide. The same arguments currently being used against the phaseout of methyl bromide were used on behalf of DDT. Producers contended that as a pesticide DDT had no viable substitute.[160] Users claimed agricultural production would be irreparably harmed if DDT was removed as a form of pest control.[161] Users also claimed because so much of the invested infrastructure of agriculture rested on the pest-free environment that DDT produced, a ban would wreak economic havoc with the food market.[162] Certain crops could not be grown without DDT and other crops would be priced high because the alternative pest control techniques were too expensive and inefficient.

Those arguments did affect the government regulatory process by slowing down the restriction of DDT. The federal government did not ban DDT until 1973, and other organochlorine pesticides were not completely phased out until 1988.[163] A more rapidly enacted ban of DDT may have avoided significant amounts of environmental and health costs compared to the slow process the government actually used.

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potential of DDT after it was used to control a potato beetle infestation in Switzerland in 1941. Research and production of DDT was kept a military secret until the end of the war.

155. *Id.* at 33.

156. *Id.* The stability and persistence of DDT meant that it would not break down into inert compounds once it was in the environment. These chemical traits also meant that DDT could be passed through food chains; i.e., once it appeared in a lower animal it would also accumulate in every animal that consumed it higher up the food chain.

157. *Id.*

158. RACHEL CARSON, SILENT SPRING (1962).

159. BRIGGS, *supra* note 6, at xi-xii.

160. WELLFORD, *supra* note 1, at 272-75 (describing initial industry reaction to efforts to restrict use of DDT and other pesticides).

161. *Id.* at 274.

162. *Id.*

163. ALLEN ET AL., *supra* note 6, at 14. Although nearly 10 years has elapsed since the last time an organochlorine pesticide could legally be applied in the U.S., residues of the pesticide continue to cause environmental problems. *See generally* LIFE ON THE EDGE, A GUIDE TO CALIFORNIA'S ENDANGERED NATURAL RESOURCES: WILDLIFE (Carl Thelander ed., 1994).

The extra eight to ten years of allowed use of DDT and organochlorine pesticides potentially carried an exponentially larger cost because these chemicals persist once in the environment.[164] Because these chemicals remain potent and present for so long, each year of continued use contributed to a greater "reserve" of pesticide in the environment. A similar problem exists with methyl bromide, as scientists know that it persists in the atmosphere for more than a year.[165] A more rapid ban would have avoided this accumulation and magnification of toxins in the environment.

The government made another mistake in its ban of DDT that should serve as a lesson for methyl bromide. Instead of making policy and regulatory choices that would have been based on protecting health and environmental qualities, the government permitted other chemicals to be used as substitutes. Some of the pesticides that were used more intensively after the DDT ban include the carbamates (such as aldicarb and furadan), chloropiricin, organophosphates (such as nemacur), telone, and methyl bromide.[166] The impetus for benign sources of pest control was not as great in the early 1970s, but the government still could have taken a proactive role by considering alternatives to traditional chemicals. With the current situation of methyl bromide, there should be no question about the government's role in developing nontoxic alternatives.

The U.S. government should remember the lesson of the DDT ban. The government can act to restrict and ban methyl bromide without fear of an agriculture overrun with pests, overpriced agricultural commodities, and bankrupt farmers and food processors. History has shown that a widely-used pesticide can be banned and the market will adjust accordingly. Producers and users of methyl bromide who contend that no alternatives exist simply need to be forced to develop those alternatives. Once the availability of methyl bromide is removed, technology and economics will provide an alternative. That development may result in a short-term cost increase to consumers, but in the long-run the investment will pay off for the producers and users. Once the alternatives are applied in food production and processing, those development costs can be incrementally recovered by pricing structures.

Implementing the ban on use of methyl bromide is also vital from a policy standpoint. Just as the market for agricultural products is global, so is the market for agricultural inputs global. Under the current U.S. regulatory regime, methyl bromide production will cease in 2001. At that time any producer who has stockpiled methyl bromide can continue to sell it with few restrictions on its use. In addition to users being able to continue use of methyl bromide, there are no legal restrictions on the import of methyl bromide. Foreign producers, who should be subject to the production restrictions of the Montreal Protocol, may see a marketing opportunity to sell methyl bromide to U.S. sources.

The need for pesticide regulation between Mexico and the U.S. can also be tied to economic incentives.[167] With NAFTA in place, new economic elements of agri-

164. WELLFORD, *supra* note 1, at 349.

165. Mano and Adreae, *supra* note 97, at 1255.

166. *Id.*

167. *See generally* Housman & Zaelke, *supra* note 3 (describing an international system of economic

cultural input and food trade are developing, and these elements can be used to ensure that environmental goals are met.[168] For example, should the ban on methyl bromide make pepper production in Florida impractical and Mexican growers can produce peppers without methyl bromide, that market should be developed to meet the U.S. demand for peppers. A similar example on the input side would exist if a crop grown in Mexico with methyl bromide can be grown with an alternative pesticide manufactured in the U.S. Any trade barriers to that alternative pesticide should be reduced to allow Mexican growers better access to the alternatives.

As the possibility of a regional pesticide convention appears to be slight,[169] and Mexico faces significant difficulties in enforcing its own pesticide provisions, the U.S. should take the steps needed to completely ban methyl bromide. Even prior to NAFTA, the U.S. was beginning efforts to coordinate food safety concerns with Mexico. For instance, the FDA and the Mexican government have a Memorandum of Understanding for transboundary pesticide residue regulations.[170] However, most cooperative regulatory efforts have focused on harmonizing standards. Attempts to arrive at a regional pesticide agreement have not produced any tangible results, and as the following material indicates, Mexico faces a sufficient challenge in enforcing its own environmental regulations. Only by taking this step itself will the U.S. be able to stop the circle of pesticides that allows methyl bromide to continue in use.

V. Mexico: Pesticides in a Developing Country

Developing countries, such as Mexico, have relied heavily on modernizing thei r agricultural sectors while struggling towards becoming industrialized nations. During its quest for economic prosperity, the Mexican agricultural sector has primarily imitated the U.S. agricultural modernization process. Unfortunately, this model provides not only the associated benefits but includes the costs that are magnified in a developing country setting. One facet of agricultural modernization model is the reliance on pesticides. Pesticides have been seen as a necessary input to achieve high crop yields or productivity. Pesticides, including methyl bromide, introduce different issues when used in Mexico. According to a 1985 United Nations report, approximately one million pesticide poisonings occur yearly.[171] Twenty thousand

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incentives and disincentives to direct trade and environmental policies toward mutually reinforcing goals).

168. *E.g.*, Housman & Zaelke, *supra* note 3, at 551-561 (describing the use of environmental countervailing duties to compensate for competitive advantages held by countries who produce products without enforcing similar environmental laws); Espinosa & Smith, *supra* note 3, at 773-74; Copeland and Taylor, *supra* note 4, at 778-79.

169. *See* Ken Forsythe & Lori Lynch, U.S. DEP'T OF AGRIC., EFFECTS OF FREE TRADE AGREEMENT ON U.S. AND MEXICAN SANITARY AND PHYTOSANITARY REGULATIONS 4 (Economic Research Serv. 1992) (stating that the U.S. and Mexico will probably continue to rely on each country's domestic pesticide regulations and the applicable parts of the Codex Alimentarius, even after the North American Free Trade Act is fully implemented).

170. *Agriculture's Changing Focus on the Needs of Human and Earthyly Nutrition*, BUSINESS MEXICO (Am. Chamber of Commerce in Mex.), Jan/Feb. 1993.

171. Angus Wright, THE DEATH OF RAMÓN GONZÁLEZ: THE MODERN AGRICULTURAL DILEMMA 3 (1990) (describing human health costs of pesticide poisonings in developing countries).

of those incidents result in fatalities. More significantly, one half of the documented pesticide poisoning fatalities occur in developing countries.[172] These developing countries, however, are responsible for only one-third of all pesticide usage.[173] In addition to developing countries experiencing a disproportionate number of fatalities, they are also rapidly growing markets for agrichemical companies. As industrialized countries continue tightening regulations on pesticide use within their own borders, agrichemical companies have intensified marketing efforts in countries such as Mexico to maintain or boost pesticide sales.[174]

In addition to experiencing problems similar to those associated with pesticide use in the U.S., Mexico has encountered unique problems associated with its developing country status. These issues include, at minimum: lack of adequate infrastructure, such as educational, lack of financing and enforcement of pesticide regulations, and lack of governmental services to facilitate educational programs about pesticide usage and associated hazards to Mexican agricultural workers and producers.[175]

In 1992, 75,625 metric tons of methyl bromide were sold worldwide.[176] Developing [article 5] countries, including Mexico, currently use approximately 18% of the global production of methyl bromide for agricultural use.[177] In developing countries, methyl bromide is used as a soil fumigant primarily in the production and export of high value cash crops such as strawberries, cut flowers, and tobacco.[178] The production of stable foodstuffs for domestic consumption does not require the use of methyl bromide, as it is used on less than two percent of the food produced for in-country consumption.[179] The following crops are identified as the major export commodities requiring methyl bromide applications: strawberries; tomatoes; grapes; stone fruits; nursery plants; almonds; walnuts; peppers; watermelons; tobacco; and flowers.[180]

Methyl bromide is used extensively in Mexico, although statistics for its usage and application are not widely available. Furthermore, Mexico's regulations and plans to ensure compliance with the Montreal Protocol's guidelines are not readily available. With the signing of NAFTA and the resulting increased movement of ag-

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172. *Id.*

173. *Id.* at 3. Many international organizations believe that these numbers are very low due to reporting errors, particularly in developing countries.

174. Pesticide Action Network North Am. Regional Ctr., Pesticide Action Network North Am. Updates Serv., *World Agrichemical Sales Fall* (Apr. 12, 1993) (available on Econet).

175. Giles Forget, *Pesticides and the Third World*, 32 J. OF TOXICOLOGY & ENVTL. L. 11-12 (1991).

176. MBTOC, *supra* note 49, at 1.

177. *Id.* at 284.

178. *Id.*

179. *Id.* at 284. Fumigation of durables with MeBr is done primarily for protection of local stocks of feed grains and for disinfestation of imported and exported cereal grains. This was recently at issue. Mexico made an announcement that it would require all grain imports from the U.S. to be fumigated with Methyl Bromide. *In Brief*, GLOBAL ENVT'L CHANGE REP., Mar. 24, 1995, at 3. This proposed requirement, however, was later dropped. *In Brief*, GLOBAL ENVT'L CHANGE REP., Apr. 14, 1995.

180. USDA, Alternatives to Methyl Bromide: Assessment of Research Needs and Priorities, proceedings from the USDA Workshop on Alternatives to Methyl Bromide, 11,24,35 (June 29-July 1, 1993).

ricultural commodities between U.S. and Mexico's political boundaries,[181] each country's laws and regulations must also become more accessible. This accessibility will facilitate development of consistent standards and guidelines on pesticide usage, including methyl bromide, between U.S. and Mexico. The U.S. reciprocal relations with Mexico in agriculture, particularly after NAFTA, are increasingly important. In view of this relationship, the U.S. should be aware of what trade implications its pesticide regulations and its ban on methyl bromide will have on Mexico and its agricultural producers.

A. Agriculture in Mexico

Mexico is slowly joining the ranks of industrialized countries; currently 72% of the population lives in urban areas and 25% of the economically viable population is employed in agriculture, forestry or fishing.[182] Farming in Mexico falls within two broad categories: (1) subsistence farming - primarily growing maize and beans for home consumption; and (2) commercial farming. Northern Mexico's commercial farms concentrate on cotton and wheat while tomatoes and melons are grown along the rivers.[183] Sugarcane, bananas, cacao, coffee, and pineapples are grown in the southern plains and highlands.[184]

Farmers in the central and northwestern regions of Mexico grow cereals, fruits, vegetables and cotton and accordingly, exert the largest demand for agricultural chemicals.[185] According to Subsecretariat de Agricultura de la Secretariat de Agricultura y Recursos Hidraulicos (SARH) data, 250,000 agricultural producers worked 5.5 million hectares with agricultural chemicals in 1993.[186] Mexico has both restricted and prohibited the use of certain pesticides.[187] The distribution of pesticides in Mexico is comparable to a scaled down version of the U.S. distribution channels. Imported agricultural chemicals are promoted and sold through sales representatives, distributors and agents.[188]

Both Mexican commercial farmers and subsistence farmers rely on pesticide inputs but commercial farms are especially dependent on heavy pesticide use.[189] The

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181. One year after NAFTA, U.S. grain imports to Mexico grew to 3 million metric tons, a tenfold increase from 1993 to 1994. David Luhnow, *Mexico Tightens Rules on Booming U.S. Grain Imports*, The Reuter Business Reports, Mar. 24, 1995, BC cycle, *available in* LEXIS, News Library, Curnws File.

182. THE PESTICIDES TRUST, THE PESTICIDE TRAIL: THE IMPACT OF TRADE CONTROLS ON REDUCING PESTICIDE HAZARDS IN DEVELOPING COUNTRIES 87 (1995).

183. *Id.*

184. *Id.*

185. *Agricultural Chemicals*, 3 MEX. TRADE & L. REP. 6, (Int'l Trade Info. Corp.) (June 1, 1993), *available in* LEXIS, Mexico Library, Mexnws File.

186. *Id.*

187. As of 1993, pesticides restricted in use include: 1,3 dicloropropeno, aldicarb, clordano, dico fol, forato, methyl, isotiocianate, lindano, metoxicloro, mevinfos, paraquat, ethylic, parathion, pentaclorofenol and quintoceno. The following pesticides were prohibited: acid 2,4,5,-T, aldrin, BHC, cianofos, cloranil, DBCP, dialifor, dieldrin, dinitroamina, dinoseb, endrin, EPN, erbon, formotion, fumisel, kepone/clorecone, mirex, monuron, nitrofen, schradan, sodium fluroacetate (1080), and triamifos. *Id.*

188. *Id.*

189. THE PESTICIDES TRUST, *supra* note 182, at 87. The Pesticides Trust (UK) did a survey of 28

pesticide market was estimated to be (U.S.) $267 million in 1991 and (U.S.) $260.6 million in 1993.[190] An interesting link between U.S. and Mexico's commercial farms is that many Mexican growers have U.S. agribusiness partners.[191] Formation of joint ventures or leases provide less financial commitment and risk and allow foreign investors greater production involvement.[192] One investigation revealed that these U.S. companies provide capital to more than 40% of the large-scale Mexican agribusinesses and also distribute, within the U.S., produce which has been sprayed with pesticides not permitted in the U.S.[193]

Before the devaluation of the peso in December, 1994, Mexico's agricultural sector experienced difficulties. The peso's devaluation greatly magnified these difficulties, primarily by sharply increasing interest rates on agricultural production loans.[194] This spike in interest rates, in turn, lead to agricultural loans being denied to many producers, primarily small to medium-size producers. These severe liquidity problems prevented many of these producers from purchasing inputs such as fertilizers and pesticides and thus prevent them from remaining competitive with both larger Mexican producers and U.S. producers.[195]

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small vegetable and fruit farms in Mexico's northeastern Sonoro during the 1993 growing season. Organophosphate insecticides were used most frequently. "Insecticides made up 65% of total use and 77% of applications." *Id.* at 89.

Insecticides included eight insecticides which U.S. EPA has classified as Hazard Class I: parathion methyl, azinphos methyl, carbofuran, methamidophos, monocrotophos, methomyl, endosulfan, deltamethrin, and dicofol. Herbicides were used less due to financial concerns. Herbicides included paraquat, trifluralin, glyphosate, 2,4-D and fluazifop-methyl. Fungicides included captan, benomyl, chlorothalonil, mancozeb and PCNB. *Id.*

Safety concerns were minimal. Most concerns were addressed towards oral toxicity with very little understanding about dermal toxicity, long-term exposure effects, chronic effects, environmental contamination and effects upon children. Few farmers wore protective clothing or used protective equipment. *Id.* Training information had not been available for the farmers in this area. Few farmers used protective equipment or clothing. *Id.*

190. *Id.*

191. Bert R. Pena & Amy Henderson, *The Problems and Prospects of a North American Free Trade Agreement, U.S.-Mexico Agricultural Trade and Investment after NAFTA*, 1 U.S.-MEX. L. J. 259, 279 (1993). Rather than possessing an interest in foreign land ownership, U.S. agribusinesses are interested in contract farming and marketing arrangements. *Id.*

192. *Id.*

193. Esther Schrader, *A Giant Spraying Sound: Since NAFTA, Mexican Growers Are Spraying More Toxic Pesticides on Fruits, Vegetables - and Workers*, MOTHER JONES, Jan. 1995, at 35, *available in* LEXIS, News Library, Curnws File. A typical arrangement consists of a legal partnership being formed between a Mexican grower and a U.S. grower, distributor, or supermarket chain. The U.S. partner provides the capital, seedlings, and technology to cultivate the crops. The Mexican partner provides the land and labor. U.S. investment in Agriculture is up by $8 million since 1992, according to a Mexican Confederation of Agricultural Producers source.

194. *Agricultural Organizations Ask Government to Help Improve Credit Situation and Provide Other Support*, Economic News and Analysis on Mexico, Agriculture, Livestock and Fisheries Section Institution (Mar. 29, 1995) *available in* LEXIS, Mexico Library, Mexnws File.

195. *Id.* Since the beginning of 1995, agricultural production costs have increased by an average of 30% according to Central Independiente de Obreros Agricolas y Campesinos (CIOAC). CIOAC is an agriculture organization. The reduction in pesticide inputs will be praised by many environmentalists; however, these producers do not appear to be adopting alternatives to pesticides. This, in combination

B. Pesticide Manufacture and Use

A source in the Mexican Ministry of Agriculture estimated more than 165 million pounds of pesticides were used in the country in 1993.[196] In 1991, 1050 pesticides were registered with the Subsecretaria de Agricultura de la Secretaria de Agricult ura y Recursos Hidraulicos (Subsecretariat of Agriculture of the Secretariat of Agriculture and Water Resources (SARH)). In 1994, 261 active ingredients were registered with the Official Pesticides Catalogue. The breakdown of usage statistics includes: (1) 37% insecticides; (2) 27% herbicides; (3) 27% fungicides; (4) 4.6% rodenticides; (5) 3% fumigators; and (6) 1% others (pheromones, attractants, nematicides, coagulants, and seed protectors).[197]

One hundred thirty-five companies currently produce, formulate, or import pesticides into Mexico.[198] Transnational companies overwhelmingly dominate Mexico's domestic market with only 37 or 14% of the registered active ingredients manufactured in Mexico. [199] In 1990, Ciba Geigy had 15.0% of Mexico's total sales of pesticides and in 1993, had sales worth US $57.4 million.[200] European companies have displaced North American companies' dominance in the Mexican market as six of the fifteen companies dominating the Mexican market are European and account for 50% of the total sales.[201]

Methyl bromide is one of the heavily imported pesticides, as Mexico has no domestic methyl bromide production. Mexico was one of the three largest importers of U.S. produced methyl bromide, receiving a total value of $1,999,000 of MeBr in 1992.[202] A related concern is whether article 5 countries will become the target of methyl bromide producing companies during the Montreal Protocol's required ten year phaseout of methyl bromide. An opportunity to export methyl bromide to these countries is allowed as article 5 countries have been given additional allowances under the Montreal Protocol guidelines.[203] Article 5 countries have an additional ten more years than industrialized countries to comply with the Montreal Protocol's con-

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with the lack of fertilizer inputs, will result in reduced yields. In turn, this will increase the prices of most products, which can prove devastating to a developing country's attempt to control inflation. *Id.*

196. Schrader, *supra* note 193, at 34. Unlike California which requires growers and applicators of pesticides to file pesticide use reports, Mexico lacks adequate methods of determining the amounts of pesticides being used. *Id.*

197. THE PESTICIDES TRUST, *supra* note 182, at 90.

198. *Id.*

199. *Id.*

200. *Id.* Fungicide metalaxyl and various herbicides are the major products sold.

201. *Id.* The leading agrichemical companies include (by volume of sales in 1990): Ciba Geigy - 15.0%; ICI (ZENECA) 10.1%; Bayer - 9.0%; Du Pont - 7.6%; Cuproquim - 7.3%; Rhône Poulenc - 7.1%; DowElanco - 5.6%; FMC - 4.8%; Hoechst - 4.6%; ISK Mex - 4.4%; BASF - 3.9%; Monsanto - 3.8%; Shell - 2.8%; GBM - 2.6%; Agricultura Nacional - 2.6%; and others - 8.7%. *Id.*

202. CHIP CLARK ET AL., PESTICIDES ACTION NETWORK NORTH AMERICA, SOUTHERN EXPOSURE: THE PHASEOUT OF METHYL BROMIDE IN DEVELOPING COUNTRIES (1994). Total U.S. exports dollar value in 1992 was $14,317,000. *Id.*

203. *Id.* at 9.

trol measures. They can also exceed their calculated levels of consumption by 15% beyond the ceilings set for industrialized countries.[204]

Mexico is currently, however, voluntarily following the Montreal Protocol's guidelines and allowances for industrialized countries. In private correspondence, a Mexican government official outlined the government's plans to comply with Montreal Protocol guidelines.[205] Mexico is analyzing a procedure that would gradually reduce the importation of methyl bromide by the year 2000 so that methyl bromide use in Mexico would be minimal.[206] At present, methyl bromide is classified as a pesticide of restricted use and can only be obtained with a written recommendation of an official or a Mexican government authorized private technician. Methyl bromide uses are restricted to "fumigation of ground surfaces, closed warehouses, bulk sediments, equipment, vacant means of transportation and rodent control."[207]

VI. Mexico Pesticide Standards and Enforcement

Pesticide registration is required pursuant to the 1974 Law on Plant and Animal Health of the United Mexican States, chapter 5, articles 41-50.[208] MX114, an environmental regulation of Mexico, governs the registration of pesticides, fertilizers, and toxic substances, including methyl bromide.[209] Like the U.S., Mexico has a central government body responsible for registering and setting tolerances of pesticides, the Intersecretarial Commission for the Control of the Production and Use of Pesticides, Fertilizers, and Toxic Substances (CICOPLAFEST).[210] This commission is comprised of officials from the "Ministries of Health, Agriculture and Water Resources (SARH), Commerce and Industrial Development, and Urban Development and Ecology."[211] It, like the EPA, is responsible for all scientific and regulatory decisions on pesticides and requires similar health and environmental studies. The agency requirements include information about the toxicological data, efficacy data

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204. *Id.*

205. Letter from Amada Velez Mendez, Biochemical Pharmacist, Subdirector of Regulation of Substances and Services of DGSV/SAGAR, United States of Mexico, to Cindy Bushur-Hallam (Aug. 8, 1995) (on file with author) [hereinafter Mendez Letter].

206. *Id.*

207. *Id.*

208. U.S GENERAL ACCOUNTING OFFICE (GAO), PESTICIDES: COMPARISON OF U.S. AND MEXICAN PESTICIDE STANDARDS AND ENFORCEMENT, 92-140, 20 (June 1992) [hereinafter G.A.O. COMPARISON]. Mexico has a three-tiered system of environmental law. First, the General Law of Environmental Protection and Ecological Balanca (1988) represents the statutory, or first tier. Second tier is comprised of the regulations implementing the General Ecology Law and are produced by the Presidency of the Republic. The regulations provide a basis for the third tier, technical standards or norms, which are promulgated by the Mexican federal agencies. NOM are Norma Oficial Mexicana and are environmental protection norms.

209. MX114, PESTICIDES, FERTILIZERS, AND TOXIC SUBSTANCES; REGULATION, ENVIRONMENTAL REGULATIONS OF MEXICO (1995 ERM Computer Information Servs., Inc.), *available in* LEXIS, Envirn Library, Mxenv File.

210. *Id.* at 22.

211. *Id.*

and long-term environmental effects of pesticides.[212] If a pesticide is registered by the U.S. EPA, CICOPLAFEST will accept its application with a minimal review. This reliance is primarily due to EPA's reviews being more stringent than the Codex Alimentarius Commission;[213] according to CICOPLAFEST officials, they will more willingly consider EPA's reviews because of EPA's more stringent requirements and regulations.[214] Often CICOPLAFEST will require additional information concerning weather data and conditions if the foreign data do not take into account conditions or climates similar to that of Mexico.[215] Three of the four ministries in the Commission must sign, indicating a complete review, before a pesticide is approved.[216] Formerly, two divisions within CICOPLAFEST handled pesticide registration: the Office of Crop Protection registered pesticides in agriculture and forestry and an office of the Health Secretariat (Department of Environmental Health) registered pesticides for urban and industrial uses.[217] After September, 1994, the Health Secretariat office possesses sole responsibility for all pesticide registration.[218]

Mexican law includes another source for regulating methyl bromide use. Mexico enacted a comprehensive environmental statute, the General Law for Ecological Equilibrium and Environmental Protection.[219] This statute is based, in part, on U.S. laws and experiences in the environmental arena and covers pesticides and toxic substances; air, water, and soil pollution; ecology reserves; rational use of natural resources; and contamination by hazardous materials and waste.[220] This statute, like the National Environmental Policy Act (NEPA),[221] requires environmental impact assessments for both private[222] and public sectors.[223] Under Mexican law,

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212. *Id.* CICOPLAFEST also requires information concerning chemical formulation data, use and application information, and first aid information. *U.S. and Mexican Pesticide Standards and Enforcement*, 2 MEX. TRADE & L. REP. 12 (Int'l. Trade Info. Corp.) (Dec. 1, 1992).

213. The Codex Alimentarius Commission (Codex) was created under the authority of the United Nations and establishes international standards and guidelines for different foods and for food quality and safety concerns. This includes pesticide uses. These guidelines are voluntary and are enforceable only if a nation adopts these standards and guidelines as national regulations. GAO COMPARISON, *supra* note 208, at 21.

214. MX114, *supra* note 209. CICOPLAFEST will give shorter review to pesticides which have been either registered in foreign countries or countries that have adopted Codex standards. The foreign data is reviewed by the Ministry of Health's residue chemists, assuring that the information is complete and studies are scientifically sound. *Id.* at 23.

215. *Id.* Because of Mexico's limited resources, CICOPLAFEST uses scientific information from other countries that can devote more resources for these studies than Mexico.

216. *Id.* This review process can take from one month to one year, depending upon research time. After the research is complete, CICOPLAFEST could make a decision as quickly as ten days.

217. THE PESTICIDES TRUST, *supra* note 182, at 94.

218. *Id.* The UK study concluded that CICOPLAFEST did more to facilitate registering and importing of pesticides rather than attempting to improve control of pesticide usage and to avoid environmental and health damage. *Id.* at 95.

219. GENERAL LAW OF ENVIRONMENTAL PROTECTION AND ECOLOGICAL BALANCE, IN D.O., JAN. 28, 1988, *available in* LEXIS, Envirn Library, Mxenv File [hereinafter GENERAL ECOLOGY LAW].

220. *Id.*

221. 42 U.S.C.A. §§ 4321-4370d (West 1995).

222. NEPA covers private sector activities only when there is significant public participation. 42

a preconstruction environmental impact review is required when a proposed public or private project could result in either ecological imbalance or exceed statutory, regulatory or technical norm environmental standards.[224] Agricultural projects could trigger this review. The Ecology Law acts as an umbrella statute with a multitude of laws, regulations and standards contained within it. In 1992, Mexico re-evaluated and reissued all of its existing eighty-three environmental standards.[225] In addition, Mexican states are appointing delegations to initiate regional environmental policies to complement Mexico's federal agencies and policies.[226]

Methyl bromide use is regulated under the clean air provisions of the Ecology Law. Article 113 provides that:

> pollutants may not be released into the atmosphere which cause or may cause ecological imbalance or damage to the environment. All emissions into the atmosphere must observe the provisions hereof and the regulatory provisions arising herefrom, as well as the technical ecolog ical standards issued by SEDUE (now SEDESOL).[227]

Because methyl bromide is an ozone depleting substance, it damages not only the soil but also the atmosphere, and thus, contributes to ecological imbalance.[228]

The Ecology Law also contains provisions for water pollution discharges.[229] While its provisions are modeled after the U.S. Clean Water Act, some provisions are broader than U.S. regulations. For instance, Mexico regulates all effluents from agriculture, including pesticides and fertilizers.[230] The Ecology Law also contains a chapter dedicated to prevention and control of soil pollution.[231] This provision

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U.S.C. § 4332 (2)(C) (1995).

223. GENERAL ECOLOGY LAW, *supra* note 219, § 5. An environmental impact evaluation is required when "performance of public or private works or activities which may cause ecological imbalance or exceed the limits and conditions provided for in the technical ecological standards and regulations issued by the Federal Government to protect the environment." *Id.* § 5, art. 28.

224. *Id.* at tit. I, ch. V, art. 28, at 33. In this aspect, Mexican regulations are more comprehensive than U.S. NEPA regulations.

225. John R. Zebrowski, *No Longer a 'Pollution' Haven*, 16 LOS ANGELES BUS. J., Feb. 28, 1994, at C43. Additional regulations are expected to be released. As of 1992, new standards have to undergo a cost-benefit analysis. All preexisting standards have to be repromulgated and if necessary, revised, in accordance to the new cost-benefit analysis method. *Id.*

226. *Id.*

227. GENERAL ECOLOGY LAW, *supra* note 219, at art. 113.

228. Ecological imbalance is defined as "alteration of the interdependent relationships between natural elements which form the environment, that negatively affects the existence, transformation and development of humans and other living beings. *Id.* at tit. 1, ch. 1, art. 3(9), at 24.

229. *Id.* at tit. 4, ch. 2, arts. 117-133.

230. *Id.* Article 120 provides the following discharges are subject to state or federal regulation: (1) discharges originating in industry; (2) discharges originating with the municipality and its uncontrolled mixing with others; (3) discharges originating from farming activities; (4) discharges of waste, substances, or residues generated in activities from extraction of nonrenewable resources; (5) application of pesticides, fertilizers, and toxic substances; (6) infiltrations that affect aquifers; and (7) emptying of solid wastes into water bodies or flows. The Ecology Law regulates nonpoint sources and point sources the same as the U.S. *Id.* at tit. 4, ch. 2, art. 120.

231. *Id.* at tit. 4, ch. 3, arts. 134-144.

requires pesticide and fertilizer use to be compatible with the equilibrium of ecosystems.[232] Any applicator who uses a pesticide with residues that accumulate in the soil must follow conditions that will avoid or prevent the following harms: (1) soil contamination; (2) harmful alteration to soil biological processes; (3) alterations in the soil which change its benefit, use or exploitation; and (4) health risks and problems.[233] Accordingly, human safety is a concern which must be considered when applying pesticides such as methyl bromide. Article 143 provides that "pesticides, fertilizers and toxic substances are subject to the official Mexican standards and the technical standards issued in coordination by SEDESOL, SARH, SECOFI, and the Secretariat of Health to avoid creation of ecological imbalances."[234] The most significant article is article 144 because it requires SEDESOL to coordinate with the Secretariat of Health, SARH, and SECOFI to "participate in examination of the tariff schedules relating to import or export of pesticides, fertilizers, and toxic substances."[235] Furthermore, authorization may not be granted for import of pesticides, fertilizers, or toxic substances when their use is not permitted in the country where they are prepared or manufactured.[236] The "circle of poison" will be broken if this regulation is utilized properly as Mexico can forbid the importation of pesticides, such as methyl bromide, after the U.S. has placed a ban on methyl bromide's use within its own borders. Mexican produce and commodities shipped into the U.S. will no longer contain the pesticide residues that perpetuated the circle of poison.

The U.S. and European companies are the primary exporters of methyl bromide into Mexico, both with plans to restrict methyl bromide's use and eventually ban production and use. Mexico will then have two options: (1) ban importation, as required by article 144 or (2) continue to import under the discretionary language of the Ecology Law.

Packaging requirements provides another means for Mexico to regulate pesticides. Effective March 8, 1994, all products sold in Mexico must be bear a label written in Spanish prior to the product being imported into Mexico.[237] This label must contain:

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232. *Id.* at tit. 4, ch. 3, art. 134.

233. *Id.* at tit. 4, ch. 3, art. 135.

234. *Id.* at tit. 4, ch. 3, art. 143. Ecological imbalance has been defined as "alteration of the interdependent relationships between natural elements which form the environment, that negatively affects the existence, transformation and development of humans and other living beings. *Id.* at tit. 1, ch. 1, art. 2. Article 143 also requires that regulations be established concerning "final disposal of their residues, empty packaging and containers, measures to avoid adverse effects on ecosystems and the procedures for grant of the corresponding authorizations." *Id.* at tit. 4, ch. 3, art. 143.

235. *Id.* at tit. 4, ch. 3, art. 144.

236. *Id.*

237. Water Pollution Control Equipment, 4 MEX. TRADE & L. REP. 9 (Int'l Trade Info. Corp.) (Sept. 1, 1994) *available in* LEXIS, Mexico Library, Mexnws File. This decree was published in Mexico's Diario Oficial (Federal Register) on March 7, 1994. For a comparison, one can look to the FAO Code of Conduct (FAO). The FAO institutes both industrial and governmental responsibilities for pesticides labeling and packaging. First, pesticide containers should be clearly marked in agreement international guidelines. Article 10 of the FAO requires:

— use of labels that contain recommendations consistent with the country of sale's research and advisory agencies;

— use of appropriate symbols and pictographs in addition to written instructions, warnings, and

- name or business name and address of the importer;
- name or business name of exporter;
- trademark or commercial name brand of the product;
- importer's RFC number and/or their industry association registration number;
- net contents (as specified in NOM-030-SCFI-1993[238] (Norma Oficial Mexicana (NOM)- is an environmental protection norm));
- use, handling, and care instructions for the product as required; and
- warnings or precautions on hazardous products.[239]

This labeling requirement has important implications for pesticides users. First, the labeling information must be attached to the product, packaging or container. This requirement ensures that end-users are aware of the pesticides' dangers. Second, the labeling must be on the products as they are prepared for retail sale. For instance, when chemicals are sold in bulk and later placed into containers, the decree requires that these containers, which are for retail sale, must also contain the Spanish label.

Label information is frequently unavailable or incomplete, contributing to misuse by end users. During the Pesticide Trust study of twenty-eight small Mexican vegetable and fruit farms, it was noted that some pesticide containers carried label information in Spanish.[240] Some field workers observed the recommended label interval between final spraying and harvest time, but there was not universal compliance. However, the labels carried no information about re-entry levels after spraying and farmers often failed to observe re-entry time limits.[241] This type of omission represents a lost opportunity to educate farmers and farm-workers about pesticide safety through the labeling requirements. For a highly toxic substance such as methyl bromide, the applicator's understanding of its dangers is especially important. Further, avoiding injuries and using pesticides at the recommended rates also help improve economic returns. In the U.S., label information is always available concerning re-entry times and re-entry levels for pesticides. Because many of these pesticides are imported into Mexico from U.S., the re-entry information could be made available through labeling without any significant changes or costs. Furthermore,

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precautions;

— use of labels clearly showing WHO hazard classification of contents;

— use of warnings against reuse of containers and instructions for proper disposal of containers;

— use of labels that identify each lot or batch of product that can be readily communicated;

— use of labels that include month, date, and year of formulation of lot or batch and information concerning storability of the product.

UNITED NATIONS FOOD & AGRIC. ORG. (FAO), GUIDELINES ON GOOD LABELING PRACTICE OF PESTICIDES (1985) (FAO Doc. COA6/85/9); FAO, PICTOGRAMS FOR PESTICIDE LABELS; UNITED NATIONS FOOD & AGRIC. ORG, INTERNATIONAL CODE OF CONDUCT ON THE DISTRIBUTION AND USE OF PESTICIDES art. 10(4) (1986) (U.N. Doc. M/R8130, E/8.86/1/5000).

238. Mexico also has NOM certification requirements for certain products. This requires a product to have been tested in Mexico, the product must have complied with the applicable NOM and a certificate must have been granted which confirms the NOM requirements have been met. *Id.*

239. *Id.* Although country of origin is not specifically required, the U.S. Department of Commerce recommends that products being imported into Mexico contain this information.

240. THE PESTICIDES TRUST, *supra* note 182, at 89.

241. *Id.* at 158.

Mexico could also require safety information about application methods and proper safety attire.

As another form of regulation, Mexico has also enacted mandatory standards of quality for industrial products, including pesticides. Manufacturers of pesticides must illustrate compliance with these standards prior to importation.[242] Compliance may be shown in three ways, depending upon the product.[243] First, a NOM certificate must be obtained from Secretariat of Commerce and Industrial Development (SECOFI) for industrial products.[244] Pharmaceutical, medical equipment, and some foods and cosmetic products must be registered with the Ministry of Health (SS).[245] The last alternative requires a notice of import to be given to Mexican customs at time of importation for some medical supplies, foods, beverages, and cosmetics.[246]

Finally, Mexico also requires free sale certificates for imported pesticides.[247] This certificate documents that the pesticides are also sold in the country of origin.[248] This certificate could have important implications in the near future on the sale of methyl bromide. Methyl bromide production and use in the U.S. will be banned after the year 2001.[249] If this certificate is given effect, methyl bromide would not be marketable in Mexico after 2001 because of the ban on sales in the United States.

A. Environmental Enforcement

The problem in Mexico is not that it lacks adequate regulations; rather the problem lies in enforcing its environmental regulations. As with many developing countries, Mexico lacks resources necessary to ensure compliance. Comparing agency budgets between the U.S. and Mexico illustrates the lack of enforcement resources. In 1991, U.S. EPA's budget was $ 5 billion; SEDESOL, Mexico's version of the U.S. EPA, had a budget of $ 38 million in 1991.[250] In 1992, Mexico restructured SEDESOL, also creating a new office for environmental protection, the Federal Attorney General for Environmental Protection.[251] Despite these changes, Mexico fails to adequately monitor pesticide residue levels on produce. Unlike the U.S., the majority of the monitoring in Mexico is done either by Mexican growers (which can be viewed as the fox guarding the hen house) or

242. *Water Pollution Control Equipment, supra* note 237.

243. *Id.*

244. *Id.* This includes the product being tested by an accredited Mexican laboratory. *Id.*

245. *Id.* The product label must display the SS product registration number. *Id.*

246. *Id.* The package must contain a series of documents.

247. *Agricultural Chemicals, supra* note 185.

248. *Id.* A local chamber of commerce letter is sufficient proof.

249. *See supra* notes 82-86 and accompanying text.

250. Sheldon Friedman, *NAFTA as Social Dumping; North American Free Trade Agreement*, CHALLENGE, Sept. 1992, at 27-32. SEDESOL's budget was increased almost eightfold from 1989 to 1991; Robert B. Zoellick, Under Secretary for Economic & Agricultural Affairs, U.S. Dep't of State, The North American FTA; The New World Order Takes Shape in the Western Hemisphere (Apr. 3, 1992) (State Department dispatch).

251. Zebrowski, *supra* note 225, at C43. Additional regulations are expected to be released. *Id.*

by U.S. officials at the borders.[252] Mexico also lacks adequate means of ensuring worker safety, despite having comprehensive occupational-safety laws mandating extensive precautions for workers handling toxic chemicals.[253]

Despite Mexico's shortcomings in the enforcement arena, enforcement measures are in place that do give some effect to its environmental laws. Current environmental enforcement measures include: (1) plant closure, temporary or permanent; (2) negotiation of compliance agreements; (3) requirement that surety bonds be posted to ensure compliance; and (4) imposition of steep fines.[254] The measure selected depends on the severity of the violation and the past conduct history of the violator.[255]

The method of enforcement is also different when comparing the U.S. to Mexico. Mexico operates under a civil law system that does not foster compliance unless or until the violation is discovered.[256] Mexico places greater reliance on administrative measures that can include plant closures, steep fines and negotiation of compliance agreements;[257] in comparison, the U.S. relies upon judicial enforcement, whether it be a citizen or private party lawsuit or government lawsuit. In contrast, nonjudicial administrative law procedures are utilized by Mexico to decide whether to close a plant, impose a fine or agree to a voluntary compliance agreement.[258]

B. Tolerance Levels

Both the U.S. and Mexico have pesticide tolerance setting requirements that govern pesticides residues on foods. Three categories of differences in tolerance

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252. Schrader, *supra* note 193, at 34.

253. *Id.* A prominent Mexican pesticide expert, Dr. Auturo Lomeli of El Grupo de los Cien, was quoted stating that "regulations can be very good on paper, but if they don't verify and enforce them, it's as if they don't exist. Inspection and enforcement of worker-safety standards are almost unheard of. In all my years of travelling to the fields, I've never seen a worker properly garbed for pesticide application." *Id.*

NAFTA side agreements on labor and environment would allow private citizens to complain if a government or industry was violating labor or environmental laws. However, they must prove that the government's persistent practice was to not effectively enforce these laws. The complaint must first be brought before a national office. Then the decision will be made whether to establish an intergovernmental dispute- settlement panel. North American Agreement on Environmental Cooperation arts. 15(2), 15(7), 24(1), 45(2), at 758-93 (CCH 1994).

254. *Id.*

255. *Id.* Unlike U.S. law, Mexico will shut down a facility prior to negotiations. The government acts, then investigates to determine the presence and/or extent of the alleged problem.*Id.*

256. Zebrowski, *supra* note 225, at C43. The U.S. common law tradition and the possibility of a lawsuit due to environmental problems does more to ensure compliance when contrasted with the civil law system. Furthermore, Mexico, unlike the U.S., does not has an equivalent U.S. Superfund law. *Id.*

257. *Id.* Enforcement inspections are becoming more prevalent. Between 1992 and 1993, SEDESOL's enforcement inspections increased dramatically as more than 16,000 inspections were conducted. Of these inspections, 1,161 companies were temporarily partially closed and 216 companies were temporarily totally closed. *Id.*

258. Stephen Zamora, *The Americanization of Mexican Law: Non-trade Issues in the North American Free Trade Agreement*, 24 L. & POL'Y INT'L BUS. 391, 410 (1993).

setting requirements exist between U.S. and Mexico. The largest category of differences between the two countries is pesticides having general tolerance levels in both countries but lacking tolerance levels for certain commodities in the United States.[259] For example, the pesticide acephate has tolerance levels in both the U.S. and Mexico. Mexico has acephate tolerance levels set for cabbage and broccoli. U.S. does not have acephate tolerances for these vegetables.[260] As of 1992, fifty-eight pesticides fell into this category.[261] The second category of difference included seventeen pesticides with Mexican tolerance levels but no U.S. tolerance levels.[262] The third category presents the most problems for harmonizing regulatory efforts: pesticides that have tolerances in both the U.S. and Mexico, but have different tolerances for the same commodities.[263] This category presents the difficult issue of whether a nation should lower its tolerances and arguably sacrifice its health and safety requirements. In the wake of NAFTA, many environmental groups voiced concerns that the U.S. would lower its tolerances on pesticides to that of Mexico's, and then allow commodities to enter the U.S. which contain higher levels of pesticides.[264] A working group of U.S. and Mexican officials are discussing alternatives to resolving these differences and are concentrating on resolving the differences in the first and second category.[265]

Pesticide tolerance levels differ between the U.S. and Mexico for three primary reasons. First, Mexico has different climatic conditions, that include warmer temperatures, different soil compositions and different pests.[266] Second, Mexico and the U.S. differ in their crop production methods and systems. For example, Mexico growers produce a larger variety of peppers and utilize slightly different methods of producing these peppers;[267] accordingly, the U.S. and Mexican producers have diverse pesticide needs.[268] Finally, CICOPLAFEST not only uses EPA reviews of data but also reviews data from CODEX and other developed countries.[269] By using data reviews from other countries, Mexican officials arrive at tolerance levels that differ from U.S. tolerances.

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259. GAO COMPARISON, *supra* note 208, at 24.

260. *Id.* at 27.

261. *Id.*

262. *Id.* at 24. The second category includes pesticides that have never had EPA registrations and tolerances and one pesticide that was voluntarily withdrawn by the manufacturer from registration. *Id.* at 28-29.

263. *Id.* at 24. The third category identified was pesticides with tolerances in both countries but the tolerance levels were set at different levels for the same commodities. *Id.*

264. *Id.* at 13.

265. *Id.* at 24. The officials include representatives from the U.S. EPA, FDA and USDA and Mexico's CICOPLAFEST, primarily the Ministry of Agriculture and Water Resources. *Id.*

266. *U.S. and Mexican Pesticide Standards and Enforcement*, 2 MEX. TRADE & L. REP. 12 (Int'l Trade Info. Corp.) (Dec. 1, 1992) *available in* LEXIS, Mexico Library, Mexnws File.

267. GAO COMPARISON, *supra* note 208, at 25.

268. *Id.*

269. *Id.*

VII. Methyl Bromide Alternatives

Agricultural producers in the U.S. and Mexico encounter one common recurring question - what viable alternatives exist for methyl bromide? Unfortunately, no one alternative perfectly replaces methyl bromide.[270] Methyl bromide was listed as an ozone-destroying agent in 1992 and the Methyl Bromide Technical Options Committee (MBTOC) was subsequently established by the parties to the Protocol, including Mexico and the United States. The MBTOC released a report in 1994 which reviews, at great length, alternatives to methyl bromide for applications in all forms of agriculture.[271]

According to the MBTOC report, less than 10% of the 1991 uses of methyl bromide do not have a technically feasible alternative, either currently available or at an advanced stage of development.[272] In other words, 90% of 1991 methyl bromide uses have feasible alternatives or replacements.[273] When reviewing alternatives to methyl bromide, consideration must be given to the status of the country. Is it an industrialized country such as the U.S. or is it an article 5[274] developing country such as Mexico? As the MBTOC report pointed out, article 5 countries must be given both technical and financial assistance in introducing or adapting alternative materials and methods to manage pest which are currently controlled by methyl bromide.[275] Consideration must also be given to trade restrictions. Mexico and other developing countries now produce certain exports which are heavily dependent upon the use of methyl bromide. Stopping methyl bromide use without an alternative treatment could create disastrous economic results. Nonetheless, alternatives do exist which can be utilized by these countries to avoid economic hardships.

No single chemical treatment or series of treatment exist that will act as a complete substitute for methyl bromide. Instead, depending upon the use of methyl bromide, a system of integrated pest management (IPM) consisting of alternative chemicals, nonchemical measures and production methods can be utilized. The IPM approach combines economic use of pesticides with use of biological, cultural

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270. If one such chemical alternative did exist, it may perpetuate the theme of lessons not learned from past mistakes, ie: use of DDT and chlorofluorocarbons. Furthermore, the replacement of one chemical with another more toxic chemical continues the phenomenon often referred to as the pesticide treadmill. *See* Kablack, *supra* note 10, at 282.

271. MBTOC, *supra* note 49, at 1-303.

272. *Id.* at 3. In one committee member's opinion, 100% of methyl bromide use could be replaced with viable alternatives within ten years. *Id.* at 125.

273. *Id.* at 3.

274. Article 5 of the Montreal Protocol sets out the guidelines for developing countries. A developing countries is one whose "annual calculated level of consumption of a controlled substance is less than 0.3 kilograms per capita." CLARK ET AL., *supra* note 202, at 4.

275. MBTOC, *supra* note 49, at 284.

and other nonchemical methods.[276] The overall goal of IPM is to maintain the pest population below economically damaging levels.[277]

Current research and technology make it clear that methyl bromide is not an indispensable element of agricultural production.[278] One chemical will not serve as the universal replacement for methyl bromide, there are a variety of alternatives that will provide growers and consumers with the necessary levels of pest control.[279] Although most of the environmental groups may not acknowledge it, the primary objection to the use of methyl bromide is the unrestricted release after treatment.[280] The most practical alternative to immediately reduce ozone damage is to recapture methyl bromide after it has been applied. Of course, this approach does not work for soil fumigation, but for the other applications it does present a viable alternative to the complete ban of methyl bromide. One study of sealed containers found that after 200 fumigation cycles, 97% of the initial amount of methyl bromide could be recaptured and reused.[281] Minimizing leakage and improving container seals is another alternative for producers. Part of the problem stems from the "more is better" thinking that often accompanies chemical use. Frequently fumigators intentionally overapply methyl bromide to account for leaks and uneven distribution through the container.[282] By using better containers and ensuring more efficient distribution of the methyl bromide in the container, further emission reductions can be achieved. Other research indicates that lesser amounts of methyl bromide can be effective if used at higher temperatures or when combined with other relatively safe gases, such as carbon dioxide.[283]

A. Alternatives to Soil Fumigation in Developing Countries

Seventy percent of the total imported methyl bromide in article 5 countries is used for pre-plant fumigation.[284] This fumigation is done primarily for nursery-bed preparation for tobacco, flowers, vegetables and strawberry seedling production.[285] Alternatives to methyl bromide soil fumigation consist of both chemical and nonchemical methods.[286] Chemical alternatives for soil fumigation

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276. Econ. Res. Service, U.S. Dept. of Agric., *Integrated Pest Management: How Far Have We Come?*, AGRICULTURAL OUTLOOK, May 1994, at 24.

277. *Id.* Through scouting and other pest monitoring techniques, pest presence is determined and economic thresholds which warrant treatment are determined. IPM can be broken into three components. First, pests and natural enemies of crops must be identified. Second, pest population must be monitored. From this data, an economic threshold or pest "injury level" can be determined. Finally, treatment begins only after pest population are approaching the "injury level." *Id.* at 24-25.

278. *See generally* RESEARCH AGENDA, *supra* note 7; ALTERNATIVES WORKSHOP, *supra* note 29; ALLEN ET AL., *supra* note 6; ROSTOV AND SCHOENFIELD, *supra* note 6.

279. *See also* Blank and Leidner, *supra* note 41, at 32 (describing eleven alternatives to methyl bromide, including solarization, telone, and biological controls).

280. Taylor, *supra* note 6, at 256.

281. *Id.*

282. *Id.*

283. *Id.*; *see* RESEARCH AGENDA, *supra* note 7, at 3.

284. MBTOC, *supra* note 49, at 289.

285. *Id.*

286. It should be noted that the Netherlands and Germany have completed eliminated the use of

consist of dazomet, 1,3-dichloropropene, metam sodium, chloropicrin (also chloropicrin/methyl bromide (67/33 mixture)) and formalin. Each of these alternatives has its own drawbacks, however, that must be overcome. The compound, 1,3D, because it is less volatile than methyl bromide, does not require tarping to be contained. Therefore, it is relatively less expensive to use when compared with methyl bromide. However, it does not provide comparable weed seed or disease control.[287] Chloropicrin, while an effective insecticide and fungicide, lacks the effectiveness of methyl bromide for nematode control. It also possesses a pungent odor (as it is a tear gas) and can be unpleasant or hazardous to handle.[288] Metam sodium fails to possess the efficacy of methyl bromide as a fungicide or nematocide. It also requires a longer time period between application and planting for certain crops.[289] Dazomet (which is 98% basamid) is a nonvolatile nematocide which consists of carbon, nitrogen, sulfur and hydrogen and is not an ozone depleting substance.[290] With Dazomet, worker exposure is minimized because basamid is a solid material that stays inert after application.[291] The end products of basamid are bicarbonate and naturally occurring nitrogen and sulfur compounds, all innocuous compounds to humans and the environment.[292] This chemical is the most user friendly and environment friendly of the above-listed alternatives. But all of these chemical alternatives still have the potential to be harmful to both the environment and humans and thus require specific training and regulation to ensure safe, effective use.[293]

Nonchemical alternatives to soil fumigation with methyl bromide include crop rotation, organic amendments and biological controls, steam and solarization. Crop rotation techniques include: rotation of nonhost plants with agronomic and horticultural plants; forage and pasture crops with agronomic and horticultural plants; or inclusion of disease resistant or tolerant cultivars within the cropping system.[294] Crop rotation provides beneficial soil organisms more time to fight crop pests and to break pest life cycles. Organic amendments include livestock

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MeBr in soil fumigation. This was done through a system of integrating nonchemical alternatives such as steam sterilization techniques, resistant plant species, and crop rotation with chemical alternatives such as metham-sodium, dazomet, and 1,3-dichloropropene. *Id.* at 69 (citing Anonymous, 1992, Proceedings of The International Workshop on Alternatives to Methyl Bromide for Soil Fumigation, U.N. Environment Programme, (Rotterdam, Oct. 19-21, 1992, Rome/Latina, Oct. 22-23, 1992).

287. RESEARCH AGENDA, *supra* note 7, at 11.

288. *Id.*

289. *Id.* at 12. Metam sodium also can have excessive labor and material costs due to the time of application, fall.

290. *Id.*

291. *Id.*

292. *Id.*

293. MBTOC, *supra* note 49, at 290.

294. A University of California study explored alternatives to MeBr. The report concluded that 4-year crop rotation (with grains and cereals) and soil solarization worked reasonably well. "After an extensive crop rotation, yields should be similar to those achieved with Methyl Bromide." ROSTOV AND SCHOENFIELD, *supra* note 6 (citing D. SUNDING ET AL., ECONOMIC IMPACTS OF METHYL BROMIDE CANCELLATION 14 (Dep't of Agric. & Resource Econ., Univ. of Calif. at Berkeley, Feb. 1993)).

manures, paper and forest industries waste products, or by-products from agricultural, food or other industries.[295] Biological controls include introduction of rhizobacteria through seed coverings or coatings.[296] Steam and solarization are less common methods but offer promise with further development. Steam is utilized to pasteurize soil using steam at temperatures of 70-80°C. This method can be as effective as methyl bromide if under appropriate conditions. This method is used primarily in greenhouse operations.[297] Solarization involves treatment of the soil with solar heat by covering the soil with thin transparent plastic for prolonged periods. This technique is most successful in dry climates with intense solar heat and a low frequency of cloudy days.[298] Besides the climatic conditions, another drawback to this method is the requirement of four to eight weeks of treatment periods.

At least one developing country, the People's Republic of China, does not use methyl bromide in its production of forestry tree nurseries.[299] Rather, it follows the IPM strategy, using a combination of methods. The methods include crop rotation, fallowing, burning, soil solarization, and repeated ploughing and raking of the soil.[300] Seeds are disinfected through use of seed treatments prior to planting. Other treatments include formalin, sodium hypochlorite, hot water and botanical extract from *Stellaria chamaejasme*.[301] This example illustrates how article 5 countries can successfully utilize methyl bromide alternatives.

B. Alternatives to Durable Fumigation in Developing Countries

Durable commodities fumigation entails fumigating warehouses where large lots of grains[302] and other nonperishable items are stored for long periods. This is another application for which methyl bromide is highly effective. Imported durables are also fumigated, often because of the potential for releasing unknown or undetected pests into the host country. Chemical alternatives for fumigating durable goods include phosphine and carbon dioxide. Phosphine is the only fumigant alternative that can be used on edible products.[303] Two drawbacks to phosphine use are: (1) three to seven days are required to achieve 100% kill; and (2) phosphine is phytotoxic to some fresh commodities.[304] Furthermore, insect pest resistance to phosphine has been identified in several article 5 countries.[305]

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295. MBTOC, *supra* note 49, at 70-71.

296. *Id.* at 72.

297. *Id.* at 76-77.

298. *Id.* at 77. Areas such as the Mediterranean (Greece, Israel, Italy, or Spain) or in climates similar to the Mediterranean have the most successful results with this technique. Cooler climates have taken advantage of this method by utilizing plastic houses or greenhouses. *Id.*

299. *Id.* at 102.

300. *Id.*

301. *Id.* China also applies beneficial micro-organisms to the seeds and seedlings roots during transplanting. *Id.*

302. Commodities include maize, wheat, barley, rice and beans.

303. MBTOC, *supra* note 49, at 290-91.

304. USDA, *supra* note 180, at 15.

305. MBTOC, *supra* note 49, at 291. If phosphine is handled improperly, a potential for a fire

Several nonchemical alternatives for durable fumigation do exist. Sulphuryl fluoride (for wood), carbon dioxide, hot air treatments, steam treatments, hot water dips, hermetically sealed storage, controlled atmospheres, and irradiation are such alternatives.[306] A combination of heat (32-37° C), phosphine gas (65 to 100 ppm) and carbon dioxide (4-6%) has also been a successful treatment against several species of stored product insects.[307]

VIII. Conclusion: The Aftermath of 2001 and Policy Considerations

Both United States and Mexico are parties to the Montreal Protocol.[308] In the Federal Register on May 10, 1995, U.S. EPA published a Final Rule which states at section 82.4(c):

> [P]rior to January 1, 2001, for class I, Group VI (methyl bromide) controlled substances, no person may produce or . . . import, at any time in any control period, in excess of the amount of unexpended consumption allowances held by that person under the authority of this subpart at that time for that control period.[309]

The U.S. EPA has allowed the phase out of methyl bromide to extend one year beyond that Montreal Protocol guidelines' date until 2001, while Mexico hopes to reach minimal usage of methyl bromide by the year 2000.[310]

Nevertheless, a question yet unanswered is what becomes of the methyl bromide manufacturers after the year 2001. One option for the companies is to relocate into countries which have not signed the Montreal Protocol. The U.S. regulations provide that prior to 2001, methyl bromide can not be produced or imported beyond unexpended production allowances or unexpended article 5 allowances.[311] Furthermore, unless a party has authority under the Clean Air Act, that party can

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hazard does exist. *Id.*

306. *Id.* at 136-145.

307. CLARK ET AL., *supra* note 202, at 26.

308. David M. Friedland & David G. Isaacs, *Worldwide Community Takes Action on Ozone*, NAT'L L. J., June 14, 1993, at 30. Methyl bromide was added as ozone depleting chemical in 1993. *Recent Developments: In the Federal Agencies*, 23 Envtl. L. Rep. (Envtl. L. Inst.) 10461 (July 1993)). According to the Montreal Protocol guidelines, methyl bromide is to be phased out by January, 2000 and the production levels are to be frozen at the 1991 production levels. *Id.*

309. 60 Fed. Reg. 24,970, 24,988 (1995) (final rule). Import has been defined to mean "to land on, bring into, or introduce into, or attempt to land . . . into any place subject to the jurisdiction of the United States." *Id.* at 24,988-89. Only parties which have been given allowances under the CAA are allowed to produce or import MeBr. If not listed in § 82.5(f), that company is then forbidden from manufacturing or importing MeBr. Great Lakes Chemical Corp. and Ethyl Corporation are the only two companies with production allowances. These two companies, plus AmeriBrom, Inc. and TriCal, Inc. are the only four companies with consumption allowances. By the year 2001, all allowances are to be reduced to zero. *Id.*

310. Mendez Letter, *supra* note 206.

311. 60 Fed. Reg. 24,970-01, 24,988-89 (1995).

not use the production allowances without holding corresponding consumption allowances.[312]

After 2001, the current regulations prohibit the use and production of methyl bromide in United States.[313] This provides a disincentive for companies to relocate into other countries as the U.S. will not allow the importation of methyl bromide. Current U.S. law also requires imports of all pesticide products to be registered with the EPA. Accordingly, Mexico can produce and import pesticides into the U.S. that are U.S. registered and meet the U.S. approved specifications, including labeling requirements. NAFTA has not changed the U.S. requirements. Once the production and use of methyl bromide is banned in U.S., the avenue of importing methyl bromide into the U.S. should be closed.[314]

As to the Mexican regulations, Mexico has more stringent pesticide regulations than the United States.[315] Once the use of a pesticide has become illegal, the manufacturing of that chemical also becomes illegal.[316] Once a pesticide has been banned for use in the country of manufacture or preparation, Mexico will not authorize importation of that pesticide.[317] Mexico currently imports methyl bromide as methyl bromide is not manufactured within Mexico.[318] Once the U.S. ban on methyl bromide production and use becomes effective, Mexican laws will then prohibit the import of methyl bromide.

One potential concern is whether countries will continue to require imported commodities to be treated with methyl bromide. For example, in early 1995, Mexico issued regulations which would have required grain being imported from U.S. to be fumigated with methyl bromide.[319] These regulations were subsequently withdrawn after pressure from the U.S. government and U.S. commodity groups. However, fruits such as peaches, plums and nectarines must also receive post-harvest treatment with methyl bromide.[320] Importing countries will have to change their quarantine regulations which require commodities to be treated with methyl bromide before granted market access.

As noted above, U.S. and Mexico have and continue to harmonize standards governing pesticide use.[321] Further strides must be made in reaching a regional

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312. *Id.*

313. *See supra* notes 82-86 and accompanying text.

314. Neither domestic or foreign producers of methyl bromide will be allowed to produce or import MeBr into the U.S. after 2001 under the current U.S. laws. *See, e.g.*, 60 Fed. Reg. 24,988-89 (1995).

315. *See supra* notes 208-236 and accompanying text.

316. CICOPLAFEST, OFFICIAL PESTICIDES CATALOGUE 75 (1993).

317. GENERAL ECOLOGY LAW, *supra* note 219, at ch. 3, art. 143.

318. Asociacion Nacional de la Industria Quimica, A.C. (Chemical National Ass'n), Mexico, Facsimile Transmission on Feb. 26, 1996, Ing. Gaston Garduno, Foreign Trade Assistant (on file with author).

319. Luhnow, *supra* note 181. These regulations were later dropped after a significant outcry from the U.S. agricultural sector and government. According to one U.S. source, U.S. grain suppliers would not have fumigated the grain in the U.S. The fumigation would have taken place in Mexico and Mexico was not equipped to spray the amount of grain U.S. suppliers wanted to ship. *Id.*

320. *Keeping Up With Mexico's Regulations; Business Regulations that Affect Agriculture*, AGEXPORTER, Aug., 1994, at 19.

321. *See supra* notes 256-73 and accompanying text.

agreement to cover methyl bromide and other pesticides. The NAFTA Supplemental Agreement on Environmental Cooperation states "each party shall consider prohibiting the export to the territories of the other parties of a pesticide or toxic substance whose use is prohibited within the Party's territory."[322] Article 2 of the Environmental Agreement provides that the Parties "shall consider implementing in its law any recommendation developed by the Council under Article 10(5)(b)."[323] Rather than negotiate a separate agreement on methyl bromide, provisions of the supplemental NAFTA Environmental Agreement should be utilized. The Council can make recommendations concerning MeBr as a pollutant and then implement these recommendations into their laws. This means of incorporation could provide the way for the Parties to harmonize and eventually phase-out requirements that imported commodities be fumigated with methyl bromide. This type of agreement also makes it more difficult for either Party to unilaterally undo environmental regulations.

Both GATT and NAFTA require that a Party's sanitary or phytosanitary measures be necessary to protect human, animal or plant life or health and be based on scientific principles.[324] The MBTOC report indicates that viable alternatives do exist for 90% of methyl bromide's current uses. Based upon this report, the U.S. or Mexico must justify the requirement of fumigation with methyl bromide based upon scientific principles. Currently, either country may be able to do so because many of methyl bromide's alternatives are still being explored and developed.[325] However, by the year 2001, alternatives should be proven as reliable and effective replacements, thus presenting a challenge to the scientific justification of requiring methyl bromide fumigation.

Mexico's statutes and regulations are designed to adequately regulate the registration of pesticides. Pesticide usage is also subject to stringent regulatory requirements through the Mexican Ecology Law. However, as described above, Mexico falls short in enforcing these regulations and statutes. This lack of enforcement is primarily due to lack of resources and infrastructure, an expected problem in a developing country. Education about pesticide usage and the associated hazards is severely lacking, particularly among small producers. However, with assistance from the U.S., both public and private sectors, many of the enforcement hurdles can be overcome.

Adoption of MeBr alternatives in Mexico will involve factors that differ from adoption of alternatives in the United States. Consideration must be given to the

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322. North American Agreement on Environmental Cooperation art. 2(3) ("Furthermore, the agreement provides that a Party shall notify the other Parties when it prohibits or restricts the use of a pesticide or toxic substance within its territory.").

323. *Id.* at art. 2(2). Article 10(5)(b) states: "The Council (representatives of the Parties) shall promote, and, as appropriate, develop recommendations regarding appropriate limits for specific pollutants, taking into account differences in ecosystems." *Id.*

324. North American Free Trade Agreement ch. 7, art. 712, at 165 (CCH 1994); *General Agreement on Tariffs and Trade, Analytical Index: Guide to GATT Law and Practice* art. 20(b) (GATT Secretariat, 6th ed. 1994).

325. *See e.g.*, MBTOC, *supra* note 49; RESEARCH AGENDA, *supra* note 7.

climatic, technological, and economic differences. Technological transfers will be necessary to permit developing countries to evaluate and implement suitable alternatives to methyl bromide, and local officials must be trained to facilitate the usefulness of this technology transfer. The U.S. and Mexico could jointly continue conducting research to attain alternatives that are economically efficient, affordable, safe for the agriculture workers and also environmentally sound. A joint effort would save valuable financial and human resources. This task will not be easy as already seen by the research conducted on methyl bromide alternatives. However, if a joint effort is successful, this approach to regulation of pesticides and the search for safe alternatives could serve as a model for pesticide regulation throughout the Western Hemisphere.

Part of the foundation for such an agreement already exists in the form of the Technical Working Group on Pesticides established under the Canada-U.S. free trade agreement.[326] After both the Canadian Pesticide Management Regulatory Agency (PRMA) and the U.S. EPA conducted parallel reviews to register the insect growth regulator tebufenozide as a pesticide, both agencies compared their respective procedures.[327] Representatives from both agencies found that they were utilizing the same procedures and respected the scientific foundations used for their respective risk assessments.[328] Instead of expending the resources for parallel review, both Canada and the U.S. agreed to begin conducting joint reviews for pesticide registrations.[329]

Mexico attended a joint meeting of the bilateral Technical Working Group on Pesticides earlier this year.[330] Although the participation of the Mexican government was that of an observer, this involvement could be the beginning of the needed joint program between all three countries.[331] Sharing the scientific and data review responsibilities would also help with bringing pesticide regulations and standards into harmony between the two countries. For example, the NAFTA mandates for phytosanitary requirements being based on legitimate scientific rationales under articles 752 and 754 could be met using results from joint reviews.[332] Having this type of strict joint pesticide regulatory framework in place can ensure that as new nations join NAFTA, there will be no slippage in environmental standards.[333] Furthermore, when substances such as methyl

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326. *Canada, U.S. to Jointly Review Pesticide Registrations*, PEST. & TOXIC CHEM. NEWS, July 12, 1995, *available in* 1995 WL 8218137 (noting that a backlog of pesticide registration applications and diminishing budgets also motivated the joint effort).

327. *Id.*

328. *Id.*

329. *Id.* The EPA representative notes that details are still be developed as to the extent of joint reviews and procedure for peer reviews. *Id.*

330. *Id.*

331. *Id.*

332. *See* PAUL, HASTINGS, JANOFSKY & WALKER, NORTH AMERICAN FREE TRADE AGREEMENT: SUMMARY AND ANALYSIS 109-112 (1993) (summarizing NAFTA environmental provisions).

333. Note that Chile is expressing interest in becoming the fourth party to NAFTA. *See Talks with Chile on NAFTA, Label Laws Continue Unofficially*, [1996] Int'l Trade Rep. (BNA) No. 8, at 275 (Feb. 26, 1996) (highlighting ongoing international efforts to bring Chile into NAFTA).

bromide with high transboundary effects must be regulated, the problem can be addressed without the issues created with differing regulatory schemes.