Another Tragedy of the Commons: Placing Cost Where it Belongs by Banning Hazardous Substances in Fertilizer Through State Legislation: A Real Life Story: Quincy, Washington's Exposure to Toxic Fertilizer

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A Real Life Story: Quincy, Washington's Exposure to Toxic Fertilizer

Quincy, Washington is a small farming town like many bucolic farming communities across America. In a good year, an experienced farmer can produce enough crops to create a comfortable profit margin. Dennis DeYoung was one such farmer, who year after year produced successful yields and strategically expanded the number of acres under cultivation. In 1985, DeYoung leased a portion of his land to another farmer, who accepted a $10,000 payment from a local fertilizer company, Cenex, to apply a mixture of toxic chemicals that they claimed had fertilizer value. What the farmer did not know was that the chemicals came from a pond that Cenex used to rinse fertilizer from farm equipment. The 38,000 gallon pond contained enough toxic chemicals to be classified as a Superfund site. Testing showed the pond contained high levels of heavy metals, suspected carcinogens, and radioactive materials, including cadmium, beryllium, and chromium.

The company would have had to pay $170,000 to ship and store the material as hazardous waste at an Oregon site. Instead, the

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chemicals were applied to DeYoung's land, which was supposed to act as a "natural filter" for the hazardous wastes. The corn crop failed that year. Consequently, DeYoung was unable to make payments, and the finance company foreclosed on the land that had been in DeYoung's family for forty years. The "land was subsequently bought by Cenex."[1]

Cenex grew a sparse and sickly cover crop of Sudan grass on the land. In addition to the mix of chemicals applied to the land as "fertilizer," Cenex also applied an herbicide called Curtail,[2] to control thistles. Curtail was not licensed for use on fodder crops, and so it was illegal to sell the Sudan grass for fodder.[3] Nevertheless, the Sudan grass was sold to Ruthann Keith, a breeder of champion Appaloosa horses. The horses eating the grass began to lose weight, grow tumors, and miscarry foals. A couple of horses also ruptured internal organs and died or were put down to relieve their suffering. The horses that did not eat the Sudan grass remained healthy.[4]

Across town, Tom Witte ran a small dairy and farmed two hundred acres. He grew both alfalfa and hay as fodder for his cows and for sale to other dairy facilities. When six of Witte's cows died of cancer within a short time, Witte had his fertilizer tested. "The fertilizer he had used was found to have levels of arsenic, beryllium, lead, titanium, chromium, copper, and mercury."[5] An analysis of hair samples from Witte, DeYoung, and their families also reported "alarmingly high levels of heavy metals."[6] The DeYoungs, the Wittes, and other farmers and farm workers were most likely exposed through multiple exposure pathways, including dermal contact during fertilizer application, inhalation of windblown soil particles, and ingestion through their food and water.

Although the story of Quincy provides a condensed picture of some of the harms caused by contaminated fertilizer, the story is not unique. A waste-derived liming agent caused peanut, soy-

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[1] Duff Wilson, *Fear in the Fields: How Hazardous Wastes Become Fertilizer, Part I*, SEATTLE TIMES, July 3, 1997 [hereinafter *Fear in the Fields*].

[2] Curtail is manufactured by Dow Chemical company and is a "32 percent solution of 2, 4-D, the herbicide made infamous by Rachel Carson's *Silent Spring*." Duff Wilson, FATEFUL HARVEST 42 (2001).

[3] *Id.*

[4] *Id.*

[5] *Fear in the Fields*, *supra* note 1.

[6] *Id.*

bean, and cotton crop failures in Tift County, Georgia[7] due to zinc levels ten times the critical toxicity level.[8] In Gore, Oklahoma, since 1986, ten million gallons per year of low-level radioactive waste have been called "liquid fertilizer" and sprayed on cattle grazing land. Although not conclusively related to this "fertilizer", "a two-nosed cow, a nine-legged frog and 124 cases of cancer and birth defects in families living near the plant have occurred."[9] Like the hazardous substances used in Quincy and Tift County, many of the hazardous substances used in fertilizer are probable, or known, carcinogens. Many of these substances are also endocrine-disruptors with the potential to cause sterility, birth defects, and other intergenerational harms in the children born to exposed women.[10]

Modern economists believe that private property rights will insulate private property and the "food basket" from contamination caused by the externalization of treatment and disposal costs

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[7] LARRY M. SHUMAN AND ZHENBIN LI, AMELIORATION OF ZINC TOXICITY IN COTTON USING LIME OR MUSHROOM COMPOST, 2 Crop and Soil Sciences Department, University of Georgia.

[8] Professor Jessica Davis, a soil scientist called in to help the farmers detoxify their topsoil found cadmium, chromium, lead, and zinc from industrial waste. . . . [A]lthough the peanuts were killed by zinc, a beneficial substance for many crops, the zinc blocked the uptake of the worst toxic chemicals. WILSON, *supra* note 2, at 177-79.

[9] *Throughout the Country, Example after Example of Hazardous Wastes Being Turned into Fertilizer*, SEATTLE TIMES, July 4, 1997, *at* http://archives.seattletimes.nwsource.com/cgi-bin/texis.cgi/web/vortex/display?slug=natl&date=070497 (last visited Mar. 12, 2003).

[10] Regarding endocrine-disruptors:

> We are *certain* of the following: . . . The patterns of effects vary among species and among compounds. Four general points can nonetheless be made: (1) the chemicals of concern may have entirely different effects on the embryo, fetus, or perinatal organism than on the adult; (2) the *effects are most often manifested in offspring, not in the exposed parent*; (3) the timing of exposure in the developing organism is crucial in determining its character and future potential; and (4) although critical exposure occurs during embryonic development, obvious manifestations may not occur until maturity.

THEO COLBORN ET. AL., OUR STOLEN FUTURE 260-61 (1997) (quoting The Wingspread Conference, *Chemically-Induced Alternations in Sexual Development: The Wildlife/Human Connection*, (1991) commonly known as "The Wingspread Statement") (emphasis added) [hereinafter STOLEN FUTURE]. The infamous therapeutic chemical DES is a well-documented example of the latent, inter-generational harms caused by endocrine-disruptors occurring in male and female children of DES-using mothers. *Id.* at 48-67.

when hazardous substances are dumped into the commons.[11] Discharging hazardous substances in fertilizer is as much a tragedy of the commons as discharging pollution into the air and water. Because every state allows toxic waste in fertilizer with unrestricted use, this tragedy may affect every person alive and yet to be born.[12]

Fertilizer has been a boon to mankind when manufactured with clean materials and used properly. However, United States Environmental Protection Agency (EPA) regulations allow, and even encourage, recycling of hazardous substances into fertilizers. Diverse potential harms from contaminated fertilizer touch all aspects of our lives, from health and safety to property rights, from environmental protection to protection of agricultural revenues.

The United States fertilizer market is a competitive $9.9 billion per year industry.[13] Therefore, there is a strong market-driven incentive to improve operating margins by externalizing pollution costs.[14] Some economists believe that market forces will cure such practices. However, as was shown by the health and environmental damage done by pesticides during the latter half of the twentieth century, market failure has been the reality, as well as the reason why a new regulatory paradigm for fertilizer is necessary. In fact, the practice is an example of such market failure because the fertilizer manufacturers do not provide product-content information necessary for consumers to make rational choices.[15] Therefore, manufacturers have not internalized the

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[11] *See* ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 59-60 (3d ed. 2000) (quoting Garrett Hardin, *The Tragedy of the Commons*, 168 SCI. 1243 (1968)).

[12] Washington, Oregon, Idaho, and Texas are the only states with labeling requirements specifically addressing waste-derived fertilizers. California's Prop. 65 would have required waste-derived fertilizers to carry a warning label except that fertilizer labels are exempt. WASH. REV. CODE § 15.54.340(1)(f)(iii) (2002); OR. REV. STAT. § 633.321(1)(a) (2002); IDAHO CODE § 22-607 (Michie 2002); 4 TEX. ADMIN. CODE § 65.13 (West 2002).

[13] UNITED STATES CENSUS BUREAU, STATISTICAL ABSTRACT OF THE UNITED STATES 527 (2001), *available at* http://www.census.gov/prod/2002pubs/01statab/agricult.pdf (last visited May 20, 2003).

[14] *See* David M. Driesen, *The Societal Cost of Environmental Regulation: Beyond Administrative Cost-Benefit Analysis*, 24 ECOLOGY L.Q. 545, 552-54 (1997). Environmental harm is a production cost "external" to the market because it is not reflected in the price to the consumer. *Id.*

[15] *See* WASH. REV. CODE § 15.54.265(1) (2002) ("The legislature intends to strengthen the state's fertilizer adulteration laws to protect human health and the

full cost of using hazardous materials.[16] Instead, they have externalized the costs onto an unsuspecting public.

The broad-based risks from contaminated fertilizer, including harm to intergenerational health and welfare, makes it imperative that the law not leave control of hazardous substances in fertilizer to discretionary or voluntary industry measures.[17] The law should not leave control of these risks to current regulatory schemes that place the burden on the challenger to prove harm, rather than on the producer to prove to the contrary. This Article proposes that the states implement a statutory ban of hazardous substances in fertilizer. A statutory ban would shift hazardous substance treatment costs to the hazardous substance generators or fertilizer manufacturers and shift the burden of proving safety to the fertilizer manufacturers.

Many reports have shown a related practice of calling hazardous waste "fertilizer" and exporting it to developing countries.[18] Several international forums have attempted to control export of contaminated fertilizer.[19] Although there are similar reasons and mechanisms that facilitate the practice inside and outside the United States, this Article addresses only the use of hazardous substances in fertilizer, and the application of contaminated fertilizer, within the United States.

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environment by: . . . (b) Allowing fertilizer purchasers and users to know about the contents of fertilizer products . . . .").

[16] Driesen, *supra* note 14, at 553.

[17] ZYGMUNT J.B. PLATER ET AL., ENVIRONMENTAL LAW AND POLICY: NATURE, LAW, AND SOCIETY 37 (2d ed. 1998).

[18] *E.g.*, Jennifer R. Kitt, Note, *Waste Exports to the Developing World: A Global Response*, 7 GEO. INT'L ENVTL. L. REV. 485 (1995) ("[M]any [lesser developed countries] are tricked into accepting wastes. The profits for waste traders and the savings for waste generators provide an incentive to deceive."). *Id.* at 490.

[19] *E.g.*, U.S. Environmental Protection Agency, *Great Lakes Binational Toxics Strategy*, *at* http://www.epa.gov/grtlakes/bns/ (last updated Apr. 11, 2003) [hereinafter BNS]; Socioeconomic Data and Application Center, *North American Agreement on Environmental Cooperation between the Government of the United States of America, the Government of Canada, and the Government of the United Mexican States*, *at* http://sedac.ciesin.org/entri/texts/bi-lateral/2.5X-N.Am-agXt-on-Env.-Co.html (last visited Mar. 5, 2003); U.S. Environmental Protection Agency, New Protocol on Persistent Organic Pollutants Negotiated under the UN Economic Commission for Europe's Convention on Long-Range Transboundary Air Pollution, *at* http://www.epa.gov/oppfead1/international/lrtap2pg.htm (last visited Mar. 12, 2003) [hereinafter POPs]; United Nations Economic Commission for Europe, *Convention on Long-Range Transboundary Air Pollution*, *at* http://www.unece.org/ env/lrtap/protocol/98hm.htm (last visited May 20, 2003).

Section I provides information on a few key hazardous substances, their sources, uses, and known harms, and the foods most commonly known to contain the substances. Section II analyzes alternative mechanisms of control over hazardous substances, ranging from doing nothing to a total ban on such substances, and explains why a total ban is the best solution.Section III discusses alternative levels of governmental implementation, ranging from federal only, to cooperative federal and state, and finally to the recommended state level implementation. This section also argues that state legislation is preferable to additional or amended regulation under existing statutes. Section IV discusses elements critical for effective state legislation. Appendix A includes the text for a model statute banning the use of hazardous substances in fertilizer.

I

HAZARDOUS SUBSTANCES, THEIR SOURCES AND USES

The problem of applying hazardous substances as fertilizer grew out of a series of loopholes in the labyrinth of federal and state laws controlling solid waste, hazardous waste, air pollution, water pollution, and fertilizer. Disposal of solid waste, including hazardous waste, was unregulated prior to 1976 when Congress passed the Solid Waste Disposal Act (SWDA).[20] The SWDA defined some solid waste as hazardous and required disposal at a hazardous waste disposal site.[21] In addition, passage of the federal Water Pollution Control Act (CWA) in 1972[22] and the Clean Air Act (CAA) in 1970[23] caused a substantial increase in the amount of solid waste, in the form of sludge and other residues from pollution control devices, containing hazardous substances in higher concentrations than the source materials.[24] These statutes used varying definitions of hazardous substances. While many of the residues from pollution control devices were classified as hazardous, and therefore to be disposed of in a hazardous waste landfill, some substances were exempted from this classification and were allowed to be disposed of as mere solid waste.

[20] 42 U.S.C. §§ 6901-92k (2000).
[21] 42 U.S.C. § 6921 (2000).
[22] 33 U.S.C. §§ 1251-387 (2000).
[23] 42 U.S.C. §§ 7401-671 (2000).
[24] 42 U.S.C. § 6901(b)(3) (2000).

The EPA promulgates regulations to implement these statutes and may delegate enforcement to the states.

The SWDA, the CWA, the CAA, and their associated regulations, are intended to control exposure to hazardous substances, but are highly fragmented by the source of the substances. As a result, fertilizer may contain an unregulated hazardous substance, either because the substance does not fall within the regulatory scope, or because it is exempted due to its source. The CWA and the CAA require specific industries and processes to use pollution control devices that trap hazardous substances, which may then be treated and reused, recycled, or disposed of in a hazardous waste landfill. However, the Resource Conservation and Recovery Act (RCRA), the hazardous waste control statute, exempts the wastes from some highly hazardous sources such as cement kilns[25] and electric arc steel plants.[26] Further, pollution caused by contaminated fertilizer is unregulated because the CAA restricts the levels of hazardous substances released into the air, but exempts releases of listed substances from agriculture.[27] Also, the CWA restricts the levels of hazardous substances released into the water but exempts runoff from agriculture.[28]

Pollution control devices required by the CWA and the CAA also create greater quantities of waste,[29] which unintentionally cause unsound disposal when the waste is distributed as fertilizer through both formal (as raw materials sold to fertilizer manufacturers) and informal (given free or at low cost to farmers and land owners) channels.

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[25] 42 U.S.C. § 6901-92K (2000) (amending Solid Waste Disposal Act). The residue from cement kilns, cement kiln dust is commonly referred to as CKD.

[26] All hazardous waste substances regulated under RCRA are listed by a unique code. Residue from electric arc steel plants is code K061. Due to the high dioxin levels in electric arc steel residue, this substance and its exemption from regulation in fertilizer is infamous. It is commonly referred to by its RCRA identifier, K061. The K061 exemption for only zinc fertilizers was removed by the Final Zinc Fertilizer Rule effective January 2003. 67 Fed. Reg. 48,393, 48,393 (July 24, 2002) (to be codified at 40 C.F.R. pt. 261, 266, 268, 271), *available at* http://www.epa.gov / epaoswer/hazwaste/recycle/fertiliz/fert-fr.pdf [hereinafter EPA Final Zinc Fertilizer Rule].

[27] 42 U.S.C. § 7412(r)(5) (2000).

[28] 33 U.S.C. § 1362(14) (2001).

[29] 42 U.S.C. § 6901(b)(3) (2000).

A. Harmful Substances

The first hurdle in banning the use of hazardous substances in fertilizer is using consistent definitions of hazardous substances.

1. Hazardous Substances Defined

Existing statutes and regulations classify, sub-classify, and define hazardous substances based primarily on whether the material is controlled directly as a source material, a waste material,[30] or as a product adulterant,[31] such as an adulterant of food or drug quality. Hazardous substances controlled as a source or waste material may be further classified by the nature of the hazard. For example, the EPA's hazardous waste regulations classify according to ignitability, corrosivity, reactivity, and toxicity.[32]

Hazardous substances controlled as a product adulterant in statutes and regulations are commonly referred to as pollutants[33] or contaminants.[34] Some statutes and regulations list specific substances considered hazardous under that measure.[35] Others do not define hazardous substances within the statute but incorporate a definition by reference.[36]

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[30] Polychlorinated biphenyls (PCBs) are an example of a regulated hazardous waste material. 42 U.S.C. § 6924(d)(2)(D) (2000).

[31] Food, Drug, and Cosmetic Act, 21 U.S.C. § 342 (2001).

[32] 40 C.F.R. § 261.21-.24 (2001); Federal Hazardous Substances Act, 15 U.S.C. § 1261(f)(1)(A)(i-v) (2001).

[33] The term "pollutant or contaminant"

> shall include, but not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring; . . .

Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601(33) (2000).

[34] The Food, Drug, and Cosmetic Act defines food adulterant as any food that "bears or contains any *added* poisonous or *added* deleterious substance (other than a substance that is a *pesticide chemical residue* in or on a raw agricultural commodity or processed food . . . ." 21 U.S.C. § 342(a)(2)(A) (2001) (emphasis added).

[35] Clean Water Act, 33 U.S.C. § 1321(b)(2)(14) (2001); Resource Conservation and Recovery Act, 42 U.S.C. § 6921 (2000); Clean Water Act, 33 U.S.C. § 1317 (2001); Clean Air Act, 42 U.S.C. § 7412 (2000); Toxic Substances Control Act, 15 U.S.C. § 2606 (2001).

[36] *See* Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601(14) (2000) (defining hazardous substances by reference to the CAA, CWA, RCRA, and TSCA).

This Article will use the term "hazardous substance" generically, unless specified otherwise, to mean toxic substances, regardless of whether the substance is defined by statute or regulation as waste, product, toxic, adulterant, contaminant, or pollutant.

a. Non-Threshold Substances

Another factor complicating hazardous substance control is whether the substance is defined as a threshold or a non-threshold substance. Non-threshold substances are hazardous substances that "have not been shown to have a threshold, that is, it has not been demonstrated that these pollutants cease to have adverse effects on human health or the environment below a certain level."[37]

Many toxic substances listed in environmental statutes and EPA regulations are non-threshold substances; they have not been proven to be safe under some specific level. This does not mean that there is no safe level or that the only safe level is zero. It means that the threshold, due to a lack of data, has not been established. Research limitations mean that legally and scientifically defensible thresholds for toxic substances are exceedingly difficult to determine.[38] Therefore, a statute requiring the party with the burden of proof to show what constitutes a safe level means that meeting or rebutting that burden is very uncertain with non-threshold substances.

The courts are split on the level of proof required to establish a legally defensible regulatory standard when a hazardous substance's threshold has not been scientifically established.[39] The level of required proof varies depending on the court's presumption. The court may presume the generator of the hazardous substance is entitled to produce up to the scientifically estab-

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[37] Lisa Heinzerling, *The Clean Air Act and the Constitution*, 20 ST. LOUIS U. PUB. L. REV. 121, 125 (2001) [hereinafter *CAA and the Constitution*].

[38] A significant issue leading to legal and scientific uncertainty for non-threshold substances is the way regulatory standards are set. Due to lack of empirical evidence in human populations, data is often extrapolated from animal studies. However, the validity of any standards based on the extrapolated data is subject to significant discourse within and between the legal and scientific communities. *See, e.g.*, Robert R. Kuehn, *The Environmental Justice Implications of Quantitative Risk Assessment*, 1996 U. ILL. L. REV. 103, 111-16 (1996) (citing several sources and discussing the political and scientific controversy surrounding use of risk assessments for carcinogens).

[39] *See CAA and the Constitution*, *supra* note 36, at 124.

lished safe limit, thus resolving uncertainty in favor of the generator.[40] Or, the court may adopt a precautionary approach and presume that the victim is entitled to be free from involuntary contamination up to the safe level, even though that level may be established with less scientific certainty.[41]

The regulatory scheme is especially important for non-threshold substances because the regulatory scheme establishes who has the burden of proving safety. Congress has not been consistent in defining which, if any, existing regulatory scheme the EPA must follow to regulate hazardous substances. A spectrum of regulatory schemes have been used, from RCRA's technology-based approach through schemes adopting the Precautionary Principle, such as FIFRA.[42]

In the absence of a congressionally mandated regulatory scheme for the EPA to follow for hazardous substances to be used in fertilizer, the appropriate regulatory scheme is one that follows the Precautionary Principle. Such a scheme acknowledges that the risks from hazardous substances in fertilizer are closely analogous to the risks from chemical pesticides. Therefore, the regulating body must have the authority to require consideration of the full range of harms and benefits without an overhanging presumption of safety. This Article will later discuss the Precautionary Principle and its implications.

The following description of harms caused by hazardous substances demonstrates why fertilizers containing hazardous substances are analogous to chemical pesticides, such as DDT. The following discussion includes only a few of the hazardous substances that may be present in fertilizer.

b. PBTs—Persistent Bioaccumulative Toxics

Persistent Bioaccumulative Toxics (PBTs)[43] are a subset of chemicals and heavy metals that exist, without breaking down, in

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[40] *See, e.g.*, American Trucking Ass'ns v. EPA, 175 F.3d 1027 (D.C. Cir. 1999), *modified in part*, 195 F.3d 4 (D.C. Cir. 1999), *rev'd*, 531 U.S. 457 (2001) (overturning EPA's particulate matter and ozone primary air quality standards as arbitrary and capricious because EPA could not prove the standards were set at the protective level with an "adequate margin of safety" for these non-threshold substances).

[41] *See* Allen v. United States, 816 F.2d 1417 (10th Cir. 1987).

[42] *See* 7 U.S.C. § 136a (2001).

[43] PBTs include a subcategory of persistent substances called "persistent organic pollutants" or POPs. The infamous pesticide DDT is a persistent organic pollutant and therefore is also a PBT which includes persistent organic and inorganic pollutants.

the environment for decades or centuries.[44] These substances accumulate in the environment and in the tissues and bones of humans, fish, and animals.[45] The presence of PBTs in bodies increases exponentially as they move up the food chain.[46] Besides their classification as known or probable carcinogens, many PBTs also cause other adverse health effects, including nervous system disorders, reproductive and developmental problems, immune-response suppression[47], and other symptoms of endocrine disruption[48].

In addition, when released into the air or water, some PBTs can be transported long distances and accumulate in areas commonly thought of as being "pristine."[49] Because PBTs act differently than most currently-regulated hazardous substances, they are specifically addressed by regulations at the international level (POPS[50]), the bi-national level (BNS[51]), the federal level (EPA

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[44] CAROL DANSEREAU ET AL., WASHINGTON TOXICS COALITION, VISUALIZING ZERO: ELIMINATING PERSISTENT POLLUTION IN WASHINGTON STATE 60 (2000), *available at* http://www.watoxics.org/content/pdf/Visualizing Zero.pdf (last visited Mar. 5, 2003) [hereinafter VISUALIZING ZERO].

[45] WASHINGTON STATE DEPARTMENT OF ECOLOGY, PUB. 00-03-054 PROPOSED STRATEGY TO CONTINUALLY REDUCE PERSISTENT, BIOACCUMULA-TIVE TOXINS (PBTs) IN WASHINGTON STATE 9 (2000), *available at* http://www.ecy. wa.gov/pubs/0003054.pdf (last visited Mar. 5, 2003) [hereinafter WA PBT STRATEGY].

[46] STOLEN FUTURE, *supra* note 10, at 27.

[47] *Id.* at 5.

[48] Endocrine systems are complex mechanisms, coordinating and regulating internal communication among cells. Endocrine systems release hormones that act as chemical messengers. The messengers interact with receptors in cells to trigger responses and prompt normal biological functions such as growth, embryonic development and reproduction. . . . Even very subtle effects on the endocrine system can result in changes in growth, development, reproduction or behaviour [sic] that can affect the organism itself, or the next generation.

ENVIRONMENT CANADA, ENDOCRINE DISRUPTING SUBSTANCES IN THE ENVIRONMENT, *at* http://www.ec.gc.ca/eds/fact/broch_e.htm (last modified Oct. 17, 2002).

[49] WA PBT STRATEGY, *supra* note 45, at 5.

[50] Members of the United Nations Economic Commission for Europe (UN-ECE) completed negotiations in February 1998 on this legally-binding protocol. The protocol will enter into force once it has been ratified by sixteen LRTAP parties. POPs, *supra* note 19. "The Executive Body adopted the Protocol on Heavy Metals on 24 June 1998 in Aarhus (Denmark). It targets three particularly harmful metals: cadmium, lead and mercury." This protocol has been ratified by 10 nations, not including the United States, as of December 5, 2001. United Nations Economic Commission for Europe, *The 1998 Aarhus Protocal on Heavy Metals*, *at* http://www.unece.org/env/lrtap/hm_h1.htm (last updated Apr. 2, 2003); *see also* United Nations Commission for Europe, *Status of Ratification of the 1998 Aarhus Protocol on Heavy Metals as of 1 May 2003*, *at* www.unece.org/env/lrtap/ status/98hm_st.htm (last updated May 7, 2003).

PBT Strategy[52]), and the state level (Washington State's PBT Strategy[53]). These PBT strategies consistently adopt the Precautionary Principle's position that once a substance has been identified as a PBT, a preference for a safer alternative is created.[54] That presumption is only overcome by sufficiently countervailing technical, economic, or social circumstances.[55]

A specific type of PBT, dioxin, is known as "the most toxic chemical on earth."[56] It is not intentionally produced in the United States. Dioxin is a contaminant that is formed when producing certain chlorinated herbicides, when incinerating a variety of chlorinated compounds such as bleached-chemical wood pulp and paper,[57] when burning fossil fuels, or when incinerating wastes containing plastic.[58] It is a known carcinogen, is "thousands of times more deadly than arsenic,"[59] and is a proba-

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[51] The Binational Toxics Strategy was signed on April 7th, 1997 by Environment Canada and the United States Environmental Protection Agency. The Binational Toxics Strategy was set forth to protect and ensure the health and integrity of the Great Lakes ecosystem. Environment Canada, the U.S. EPA in consultation with other federal departments and agencies, Great Lakes States, the Province of Ontario, Tribes and First Nations have agreed to cooperate with their public and private partners toward the goal of virtual elimination of persistent toxic substances resulting from human activity.

ELIZABETH REZEK, U.S. ENVIRONMENTAL PROTECTION AGENCY, LEVEL II SUBSTANCES ON THE BINATIONAL TOXICS STRATEGY, *at* http://www.epa.gov/ grtlakes/ bns/levelii/leviisubs.html (last modified Dec. 3, 1999) (Level I and II substances that are also found in fertilizers include mercury and dioxins).

[52] U.S. ENVIRONMENTAL PROTECTION AGENCY, U.S. EPA PERSISTENT BIOACCUMULATIVE AND TOXIC POLLUTANTS (PBT) PLENARY GROUP AND THE EPA OFFICE DIRECTORS MULTIMEDIA AND POLLUTION PREVENTION FORUM, DRAFT, A MULTIMEDIA STRATEGY FOR PRIORITY PERSISTENT, BIOACCUMU-LATIVE, AND TOXIC (PBT) POLLUTANTS, (Nov. 16, 1998), *available at* http://www.epa.gov/opptintr/pbt/pbtstrat.htm (last visited Mar. 5, 2003). Hazardous substances used in fertilizers included in the Priority PBTs strategy include mercury and dioxins.

[53] WA PBT STRATEGY, *supra* note 45. Hazardous substances used in fertilizers included in the Washington State PBT Proposed Strategy include mercury and dioxins.

[54] *E.g.*, *id.* at 16 (noting consistency with the 2000 United Nations Treaty Negotiations on Persistent Organic Pollutants).

[55] *Id.*

[56] STOLEN FUTURE, *supra* note 10, at 113.

[57] WA PBT STRATEGY, *supra* note 45, at 11.

[58] STOLEN FUTURE, *supra* note 10, at 113.

[59] *Id.*

ble endocrine disruptor[60] that contributes to the increase in reproductive organ cancers and birth defects.[61]

When applied to soil, dioxin does not leach; it remains in the topsoil for decades.[62] In RCRA, Congress recognized dioxin as a hazardous substance for which land disposal was inappropriate.[63] However, dioxin has been found in fertilizer because it "rides along" with cement kiln dust (CKD), which is a hazardous waste exempted from regulation under the EPA's hazardous waste regulations.[64] Dioxin is most commonly found in zucchini, pumpkins, cucumbers,[65] fish, meats, and dairy products.[66] Since dioxins are not listed in the Toxics Release Inventory[67] except

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[60] *Id.*

[61] *See also* JACQUELINE D. SAVITZ, ET AL., FACTORY FARMING, TOXIC WASTE AND FERTILIZER IN THE UNITED STATES, 1990-1995 13 (1998).

[62] EPA OFFICE OF WATER, NATIONAL PRIMARY DRINKING WATER REGULATIONS, TECHNICAL FACTSHEET ON: DIOXIN (2,3,7,8-TCDD), *at* http://www.epa.gov/OGWDW/dwh/t-soc/dioxin.html (last visited Mar. 12, 2003) [hereinafter TECHNICAL FACTSHEET].

[63] RCRA 42 U.S.C. § 6924 (2000) (setting standards applicable to owners and operators of hazardous waste treatment, storage, and disposal facilities).

> (e) Solvents and dioxins
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> (1) . . . land disposal of the hazardous wastes referred to in paragraph (2) is prohibited unless the Administrator determines the prohibition of one or more methods of land disposal of such waste is not required in order to protect human health and the environment for as long as the waste remains hazardous . . . For the purposes of this paragraph, a method of land disposal may not be determined to be protective of human health and the environment for a hazardous waste referred to in paragraph (2) . . ., unless upon application by an interested person it has been demonstrated to the Administrator, to a reasonable degree of certainty, that there will be no migration of hazardous constituents from the disposal unit . . . for as long as the wastes remain hazardous.
>
> (2) The hazardous wastes to which the prohibition under paragraph (1) applies are as follows:
>
> (A) dioxin-containing hazardous wastes numbered F020, F021, F022, and F023 (as referred to in the proposed rule published by the Administrator in the Federal Register for April 4, 1983), and (B) those hazardous wastes numbered F001, F002, F003, F004, and F005 in regulations promulgated by the Administrator under section [6921] of this title (40 C.F.R. 261.31 (July 1, 1983)), as those regulations are in effect on July 1, 1983.

[64] 42 U.S.C. § 6921(b)(3)(A)(iii) (2000).

[65] MATTHEW SHAFFER, WASTE LANDS: THE THREAT OF TOXIC FERTILIZER 15 (2001) *available at* http://pirg.org/toxics/reports/wastelands (last visited Mar. 5, 2003).

[66] "[T]he U.S. Environmental Protection Agency found that meats and cheeses are a major source of dioxin exposure in the United States today." STOLEN FUTURE, *supra* note 10, at 213-14.

[67] TECHNICAL FACTSHEET, *supra* note 62.

under a few conditions,[68] and never listed on product labels, it is nearly impossible for consumers to identify fertilizers containing dioxins.

"The Agency for Toxic Substances and Disease Registry (ATSDR) has adopted an interim policy guideline to assess public health implications of dioxins in residential soils on or near hazardous waste sites . . . [with] concentrations greater than 50 pptr (0.05 ppb)."[69] Washington State tested two fertilizers with dioxin levels greater than 50 pptr in 1998.[70]

c. Heavy Metals

The heavy metals category is a broad group encompassing some beneficial metals, such as copper and boron. However, several heavy metals are classified as toxic and are therefore health hazards. Toxic heavy metals include: arsenic, cadmium, cobalt, mercury, molybdeum, nickel, lead, and selenium. The following sections describe the source, exposure pathways, and health effects of a few toxic heavy metals currently found in fertilizer: arsenic, cadmium, mercury, and lead.

Arsenic from direct fertilizer application is most commonly found in onions, potatoes, root crops,[71] and grains.[72] The highest levels of arsenic are found in seafood and meat[73] because of arsenic accumulation as the substance moves up the food chain. The National Institutes of Health classifies arsenic as a known human carcinogen.[74] "[L]ow-dose exposure to arsenic may increase the risk of certain types of cancer, diabetes and vascular disease. A 1999 report by the National Academy of Sciences confirmed that

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[68] Dioxins must be reported in the TRI database only when created as a contaminant during the manufacturing process. The definition reads: "Manufacturing; and the processing or otherwise use of dioxin and dioxin-like compounds if the dioxin and dioxin-like compounds are present as contaminants in a chemical and if they were created during the manufacture of that chemical." U.S. ENVIRONMENTAL PROTECTION AGENCY, LIST OF TOXIC CHEMICALS 3 (2001), *available at* http://www.epa.gov/triinter/chemical/index.htm#chemlist (last visited Mar. 13, 2003).

[69] WASHINGTON STATE DEPARTMENT OF ECOLOGY, LEVELS OF NONNUTRITIVE SUBSTANCES IN FERTILIZERS (1999), *available at* http://www.ecy.wa.gov/biblio/99450.html (last visited Mar. 12, 2003) [hereinafter WA FERTILIZER TESTS].

[70] *Id.* at 20.

[71] SHAFFER, *supra* note 65 at 15.

[72] *See* U.S. DEP'T OF HEALTH & HUM. SERVICES, REPORT ON CARCINOGENS, TENTH EDITION: ARSENIC (2002), *available at* http://ehp.niehs.nih.gov/roc/toc10.html (last visited May 21, 2003) [hereinafter ARSENIC].

[73] *Id.*

[74] *Id.*

arsenic in drinking water causes bladder, lung and skin cancer, and might cause kidney and liver cancer."[75] Arsenic may also be an endocrine disruptor.[76]

The EPA regulates arsenic in the environment under the Clean Air Act (CAA), the Clean Water Act (CWA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Superfund Amendments and Reauthorization Act (SARA), the Resource Conservation and Recovery Act (RCRA), and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Arsenic in food and drinking water is regulated under the Food, Drug, and Cosmetic Act (FD&CA), and the Safe Drinking Water Act (SDWA).[77] However, none of these statutes cover arsenic in fertilizer. Washington State tested fertilizer with arsenic levels as high as 75.2 mg/kg-dw in 1998.[78]

The greatest human exposure to cadmium, according to the National Institute of Environmental Health Sciences, is probably from contaminated food grown on soil contaminated by phosphate fertilizers or sewage sludge.[79] Cadmium is most commonly found in corn, wheat, lettuce,[80] spinach, celery, cabbage,[81] and tobacco.[82] The National Institutes of Health classifies cadmium as a known human carcinogen.[83] Cadmium is also a PBT, and long-term exposure to this substance can cause irreversible kidney damage,[84] bone deformities,[85] lung edema, renal dysfunc-

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[75] Margot Higgins, *Heavy Metal: Arsenic is an endocrine disruptor* (Mar. 5, 2001), *at* http://www.enn.com/news/enn-stories/2001/03/03052001/arsenic_42327.asp (last visited Mar. 12, 2003).

[76] *Id.*

[77] *See* ARSENIC, *supra* note 72.

[78] WA FERTILIZER TESTS, *supra* note 69, at 13. Minnesota found arsenic levels as high as 6,190 ppm compared to California's standard for arsenic is 659 ppm. MINNESOTA DEPARTMENT OF HEALTH, SCREENING EVALUATION OF ARSENIC, CADMIUM, AND LEAD LEVELS IN MINNESOTA FERTILIZER PRODUCTS 4 (1999), *available at* http://www.health.state.mn.us/divs/eh/risk/fertrpt.pdf (last visited Mar. 12, 2003 [hereinafter MDH FERTILIZER EVALUATION];
40 C.F.R. § 261.24 (2001).

[79] U.S. DEP'T OF HEALTH & HUM. SERVICES, REPORT ON CARCINAGENS, TENTH EDITION; CADMIUM AND CADMIUM COMPOUNDS (2002), *available at* http://ehp.niehs.nih.gov/roc/toc10.html (last visited May 21, 2003) [hereinafter CADMIUM].

[80] SHAFFER, *supra* note 65.

[81] C.A. Grant et al., *Cadmium accumulation in crops*, 78 CAN. J. PLANT SCI. 5 (1998).

[82] CADMIUM, *supra* note 79.

[83] *Id.*

[84] VISUALIZING ZERO, *supra* note 44, at 16-17 (citing R.A. GOYER, TOXIC EFFECTS OF METALS, IN CASARETT & DOUL, TOXICOLOGY: THE BASIC SCIENCE OF POISONS (Pergamon Press 1991)).

tion, anemia, and hypertension.[86] Cadmium is also a known endocrine-disruptor, so even a single exposure during a critical time in fetal development may lead to a number of birth defects, some of which may not be detected until the child approaches puberty. These defects include lowered sperm counts, undescended testicles, and sexual differentiation failure in males, and malformed reproductive organs, tubal pregnancies, miscarriages, or endometriosis in females.[87]

The EPA regulates cadmium in the environment under the CWA, CERCLA, SARA, and RCRA. Cadmium in pesticides is considered so dangerous by the EPA that, under FIFRA, the agency issued a Rebuttable Presumption Against Registration (RPAR) for cadmium-containing pesticides.[88] Cadmium in food and drinking water is regulated under the FD&CA and the SDWA.[89] However, none of these statutes cover cadmium in fertilizer.

Because cadmium exposure is so ubiquitous, "renal concentrations of cadmium have already reached a level . . . where the margin of safety is small."[90] The health and welfare risks from cadmium are so great that Canada, some European nations, Washington State, Idaho, and Oregon have set limits for cadmium in fertilizers.[91] Washington State tested fertilizer with cadmium levels as high as 160 mg/kg-dw in 1999.[92]

Mercury is most commonly found in fish and shell fish, and "is a naturally occurring metal which exists as elemental mercury, inorganic mercury compounds and organic mercury (primarily

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[85] *Id.*

[86] F. Gavi et al., *Wheat Grain Cadmium as Affected by Long-Term Fertilization and Soil Acidity*, 26 J. ENVTL. QUALITY 265 (1997) (quoting R. Nath et al., *Molecular Basis of Cadmium Accumulation,* 18 PROGR. FOOD NUTR. SCI. 109-63 (1984); also G.F. Nordberg, *Health Hazards of Environmental Cadmium Pollution*, 3 AMBIO 51-65 (1974)).

[87] STOLEN FUTURE, *supra* note 10, at 42-46, 171-80, 253.

[88] CADMIUM, *supra* note 79.

[89] *See id.*

[90] Magnus Piscator, *Dietary Exposure to Cadmium and Health Effects: Impact of Environmental Changes*, 63 ENV'T HEALTH PERSP. 127, 131 (1985).

[91] WASHINGTON STATE DEPARTMENT OF ECOLOGY, NO. 00-04-025 IMPORTED CADMIUM-CONTAMINATED ZINC SULFATE USED IN FERTILIZER AND OTHER PRODUCTS, (2000), *available at* http://www.ecy.wa.gov/pubs/0004025.pdf. *See also* Gary Horstmeier, *Zinc's Problems are Many*, FARM J. (July 22, 2002).

[92] WA FERTILIZER TESTS, *supra* note 69. Minnesota tested cadmium levels as high as 106 ppm compared to California's cadmium standard of 48 ppm. MDH FERTILIZER EVALUATION, *supra* note 78, at 4; 40 C.F.R. § 261.24 (2001) (cadmium regulatory level is 1.0).

methyl mercury). All of these forms are toxic, but organic mercury is considered the most dangerous. . . ."[93] Organic mercury is a PBT so it accumulates in water, soil, sediments, plants, and animals.[94] Methyl mercury is classified by the EPA as a possible human carcinogen, is a PBT,[95] and is a known endocrine-disruptor.[96]

Organic mercury is toxic through ingestion, inhalation, and skin and eye contact. Mercury compounds can attack all body systems, causing nausea, vomiting, kidney failure, skin burns and irritation, tremors and incoordination, vision and hearing loss, memory loss, personality changes, and headache.[97] Methyl mercury is very toxic to a developing fetus, potentially causing profound mental retardation, cerebral palsy, seizures, spasticity, tremors, incoordination, and eye and hearing damage. The unborn baby is exposed in vitro from contaminated food eaten by the mother, and after birth through breast milk.[98]

"EPA currently considers only exposures less than 0.1 micrograms per kilogram body weight per day as having no adverse effects. However, over the past decade this standard has been continually adjusted downward, as scientists find adverse effects at doses previously considered 'safe.'"[99] Washington State tested fertilizer with mercury levels as high as 11.9 mg/kg-dw in 1998.[100]

Lead may be found in carrots,[101] fruits, and grains.[102] It is classified as a probable human carcinogen by the EPA. Lead is not only a confirmed endocrine-disruptor,[103] but it is also a PBT, and no safe level of exposure has been found.[104] Lead remains in the topsoil for years, where humans and animals may be exposed through direct contact, through ingesting contaminated plants, or

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[93] VISUALIZING ZERO, *supra* note 44, at 15.

[94] *Id.*

[95] *Id.*

[96] STOLEN FUTURE, *supra* note 10, at 253.

[97] CALIFORNIA POISON CONTROL SYSTEM, MERCURY AND ITS MANY FORMS (2002), *at* http://www.calpoison.com/public/mercury.html (last updated Jan. 25, 2002).

[98] *Id.*

[99] VISUALIZING ZERO, *supra* note 44, at 17.

[100] WA FERTILIZER TESTS, *supra* note 69, at 13; Toxicity Characteristic, 40 C.F.R. § 261.24 (2001).

[101] VISUALIZING ZERO, *supra* note 44, at 2.

[102] SHAFFER, *supra* note 65.

[103] STOLEN FUTURE, *supra* note 10, at 253.

[104] VISUALIZING ZERO, *supra* note 44, at 17-19.

through inhaling windblown particles.[105] Lead also enters water through runoff, thus contaminating drinking water, irrigation supplies, and fish and other seafood.[106]

In the body, lead is stored in blood, tissue, and bone. Lead from a pregnant woman's body is transferred to her unborn child.[107] The health effects of lead exposure include miscarriages, sterility, learning disabilities, behavioral problems, high blood pressure, brain damage, cancer,[108] severe intestinal cramps, nerve paralysis, and death.[109]

Lead in the environment is regulated by the EPA under the CWA, CERCLA, SARA, and RCRA. Lead in consumer products and drinking water is regulated under the FD&CA and the SDWA.[110] However, none of these statutes cover lead in fertilizer. Both Washington State and Minnesota tested fertilizer with lead levels as high as 3,490 mg/kg-dw in 1998.[111]

2. *Other Adverse Effects*

The secondary political and economic effects of cropland contamination are especially worrisome. These effects include decreased food-production-quality land, contaminated "food scares," and trade barriers. Many heavy metals and PBTs do not break down or otherwise dissipate. Thus, hazardous substances contaminate the land in addition to directly causing adverse health effects. There is growing evidence that significant environmental damage may occur,[112] such as long-term damage to

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[105] *Id.* at 17 (citing 1 U.S. ENVIRONMENTAL PROTECTION AGENCY, MERCURY STUDY REPORT TO CONGRESS: EXECUTIVE SUMMARY, 3-37-40; AGENCY FOR TOXIC SUBSTANCE AND DISEASE REGISTRY, LEAD TOX FAQS (1993)).

[106] VISUALIZING ZERO, *supra* note 44, at 17 (citing NEW JERSEY DEP'T OF HEALTH AND SENIOR SERVS., HAZARDOUS SUBSTANCE FACT SHEET ON LEAD (1986)).

[107] *Id.* at 18 (citing C.D. Carrington & P.M. Bolger, *An Assessment of the Hazards of Lead in Food*, 16 REG. TOXICOLOGY AND PHARMACOLOGY 265-72 (1992)).

[108] *Id.* at 18-19.

[109] Ethyl Corp. v. EPA, 541 F.2d 1, 8 (D.C. Cir. 1976).

[110] U.S. DEP'T OF HEALTH & HUM. SERVICES, REPORT ON CARCINOGENS, TENTH EDITION: LEAD ACETATE AND LEAD PHOSPHATE (2002), *available at* http://ehp, niehs.nih.gov/roc/toc10.html (last visited May 21, 2003) [hereinafter LEAD].

[111] WA FERTILIZER TESTS, *supra* note 69, at 13; MDH FERTILIZER EVALUATION, *supra* note 78, at 4; Toxicity Characteristic, 40 C.F.R. § 261.24 (2001).

[112] Explaining levels that qualify for superfund status. ERIKA SCHREDER, WASHINGTON TOXICS COALITION, HOLDING THE BAG: HOW TOXIC WASTE IN FERTILIZER FAILS FARMERS AND GARDENERS 11 (2001) [hereinafter HOLDING THE BAG].

cropland,[113] recreational areas, and residential property.[114] Repeated applications can build soil contaminant levels beyond the point where food or fodder may be safely grown. Contamination may potentially reach "superfund levels," thus adversly effecting market value and alienation. Although there are soil remediation methods for some hazardous substances,[115] these methods shift the cost to farmers and are "after-the-fact" rather than preventative.

Also, the unregulated use of contaminated fertilizers put agricultural export revenues at risk. Some southeast Asian countries test imports for contamination, which acts as a non-tariff trade barrier.[116] Canada implemented standards for certain heavy metals in fertilizer used in Canada due to a concern that trade barriers would be imposed on its agricultural products.[117]

Finally, a growing public awareness of harms from hazardous substances in general, and contaminated food in particular,[118] increases the likelihood of "food scares" similar to the Alar/apple event in 1989.[119]

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[113] J. Bouma, *Soil Environmental Quality: A European Perspective*, 26 J. ENVTL. QUALITY 26 (1997). Per UNEP (1992), 23% of European soil is degraded. Chemical degradation is due to heavy metals and chemical fertilizers.

[114] *See* WASH. STATE DEP'T OF ECOLOGY, NO. 99-309 FINAL REPORT, SCREENING SURVEY FOR METALS AND DIOXINS IN FERTILIZER PRODUCTS AND SOILS IN WASHINGTON STATE xv (1999) [hereinafter SCREENING SURVEY] (noting that four out of seven fertilizers intended for home gardening use exceeded the statutory limits).

[115] WILSON, *supra* note 2, at 175.

[116] Jean D. Aylsworth, *Know Your Source of Zinc*, 31 FARM CHEMICALS (1995). A dioxin scare in "[a]nimal feed contaminated with the carcinogen dioxin caused a wave of fear throughout Europe in the Spring of 1999."

[117] Aylesworth, *supra* note 116, at 31; *see also* WILSON, *supra* note 2, at 281 n.2.

[118] A 1990 poll of the "public's" top environmental concerns placed contaminated food in 18th place as a concern of 49% of those surveyed. Other hazardous waste-related concerns placed as follows: 1) Active hazardous waste sites (67%), 2) Abandoned hazardous waste sites (65%), 3) Water pollution from industrial wastes (63%), 4) Occupational exposure to toxic chemicals (63%), 8) Industrial accidents releasing pollutants (58%), 11) Leaking underground storage tanks (55%), 15) Water pollution from agricultural runoff (51%), 18) Pesticide residues in foods (49%). PERCIVAL ET AL., *supra* note 11, at 513 (quoting Counting on Science at EPA, 249 SCI. 616 (1990)).

[119] WILSON, *supra* note 2, at 279 n.2 (noting Washington State officials' concern that public awareness of dioxin levels in fertilizer could cause a food scare); *see also* Auvil v. CBS "60 Minutes", 800 F. Supp. 928 (E.D. Wash. 1992) (alleged apple contamination), *aff'd,* 67 F.3d 816 (9th Cir. 1995); Merco Joint Venture v. Kaufman, 923 F. Supp. 924 (W.D. Tex. 1996); Allen v. Delchamps, Inc., 624 So.2d 1065 (Ala. 1993) (alleged celery contamination); Texas Beef Group v. Winfrey, 201 F.3d 680, (5th Cir. 2000) (alleged "mad cow" contamination).

B. Sources of Hazardous Substances

Hazardous substances used in fertilizer come from three sources: (1) virgin material; (2) hazardous non-waste; and (3) hazardous waste.

Virgin material[120] contains naturally occurring hazardous substances. For example, phosphate ore contains traces of uranium and varying amounts of heavy metals such as cadmium, arsenic, and lead.[121] Incorporating hazardous virgin material into fertilizer is not controlled at the federal level and only Washington State and Oregon regulate hazardous virgin materials at the state level.[122]

Hazardous non-waste is a RCRA-created classification[123] applying to materials which, but for an exemption in the law would be hazardous waste, are instead considered "inventory."[124] Certain mining "wastes" fall under this exemption. Using hazardous non-waste material in fertilizer is not controlled at the federal level. However, a few states have eliminated these hazardous non-waste exemptions.[125]

Hazardous waste is material generated by various industries as either a by-product of the primary commercial product's manufacture or as waste from pollution control devices, such as chimney "scrubbers." For example, dust from factory smokestack emission control devices (required in order to meet emission reductions under the CAA) may contain arsenic, mercury, cadmium and other toxic substances.[126] Using hazardous waste in

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[120] 42 U.S.C. § 6903(35) (2000). "(35) The term 'virgin material' means a raw material, including previously unused copper, aluminum, lead, zinc, iron, or other metal or metal ore, any undeveloped resource that is, or with new technology will become, a source of raw materials."

[121] Fertilizer International, *Producers Clean Up Their Act*, No. 332 (1995); *see* The Fluoride Action Network, *The Phosphate Fertilizer Industry* (June 2001), *at* http://www.fluoridealert.org/phosphate/overview.htm.

[122] See WASH. REV. CODE § 15.54.800(3)(a) (2002), OR. REV. STAT. § 633.362(10) (2001) (setting standards for metals in fertilizer without reference to whether fertilizer is waste-derived or virgin-material-derived.

[123] Solid Waste Disposal Act, Resource Conservation and Recovery Act Amendments 42 U.S.C. § 6901-92k (2000); 40 C.F.R. § 261.2(c)(1)(B) (2001).

[124] *See* Chemical Waste Management v. United States EPA, 976 F.2d 2 (D.C. Cir. 1992).

[125] For example, Washington State set limits for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver in fertilizer. WASH. ADMIN. CODE § 173-303-090 (2000).

[126] U.S. Environmental Protection Agency, RIN 2050-AE34, Standard for the Management of Cement Kiln Dust; Proposed Rule (1999).

fertilizer is regulated at the federal level by EPA regulations under RCRA. A few states, including Washington and Oregon, have adopted additional or more stringent standards than the federal standards.[127]

C. Uses of Hazardous Substances

The second hurdle in banning the use of hazardous substances in fertilizer is using a consistent definition of fertilizer.

1. Definition Covers Fertilizers and Soil Amendments

Most statutes and regulations, at both the federal and state levels, distinguish between fertilizer and soil amendments (a.k.a. soil conditioners). Federal and state statutes and regulations may further divide fertilizer definitions into sub-categories such as macronutrient fertilizers[128], zinc micronutrient fertilizer, or phosphorous fertilizers.

The term "fertilizer" generally means any substance containing one or more recognized plant nutrients that is used for its value in promoting plant growth, including limes and gypsum.[129] "Soil conditioner" generally means any substance used to improve the soil's physical nature, but does not provide direct plant nutritive value, such as the "guaranteed plant nutrients" (nitrogen, phosphorous, potassium).[130] This Article uses the term fertilizer generically, unless specified otherwise, to mean all forms of fertilizer, soil amendments, and soil conditioners.

Fertilizers containing hazardous substances are sold for use on all forms of plant material, from ornamental[131] and recreational plants[132] to food and fodder crops. These fertilizers are sold for home and commercial use.[133] Except in extreme cases, the haz-

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[127] *E.g.*, WASH. REV. CODE § 15.54.800 (2002), OR. REV. STAT. § 633.362(11) (2002); IDAHO CODE § 22-605(9) (Michie 2002).

[128] Macronutrient fertilizers "contain nitrogen, phosphorus, and potassium (NPK fertilizers)." OFFICE OF SOLID WASTE, U.S. ENVIRONMENTAL PROTECTION AGENCY, ESTIMATING RISK FROM THE USE OF AGRICULTURAL FERTILIZERS: DRAFT REPORT 2-1 (1999), *available at* http://www.epa.gov/epaoswer/hazwaste/recycle/fertiliz/risk/report.pdf (last visited May 21, 2003).

[129] *E.g.*, WASH. REV. CODE § 15.54.270(4) (2002).

[130] *E.g.*, Act 451 of 1994, MICH. STAT. ANN. § 324.8501(aa) (2002).

[131] For example: trees, shrubs and flowers.

[132] For example: golf courses and parks.

[133] HOLDING THE BAG, *supra* note 112, at 7. Also, a study by the Washington State Departments of Agriculture and Ecology found high levels in fertilizer marketed for home use. SCREENING SURVEY, *supra* note 114, at xv. This is particularly

ardous substances do not cause visible harm to the plants. Therefore, there is no visual indication of contamination.[134] Neither farmers nor food consumers know the heavy metal content of the fertilizer or food because there are no federal labeling requirements, and few states have hazardous substance labeling requirements.

2. *Effective Substitute/Beneficial Use*

Another classifying characteristic complicating control measures is the concept of effective substitute or beneficial use. The key to the EPA's regulations promoting hazardous waste recycling is requiring that the use be beneficial.[135] Beneficial use is when the industrial wastes are used as "an effective substitute for a commercial product."[136] Therefore, under EPA regulations, hazardous substances may be recycled into fertilizers because they 'ride along' with material, such as phosphate or zinc. That is considered an "effective substitute" for virgin material.[137]

Some state fertilizer statutes define fertilizer as having beneficial properties, and define adulterated fertilizer as fertilizer containing material that is harmful to plants, animals, and/or soil.[138] Thus, hazardous substances may potentially be controlled by regulation promulgated under the adulteration provision of existing state fertilizer statutes. There have been no successful suits against fertilizer manufacturers under a state's adulteration provision.

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troubling because home users are more likely to neglect safety precautions and exceed recommended application rates.

[134] *See*, *e.g.*, Grant et al., *supra* note 81, at 1 noting that "[p]lants can accumulate relatively high levels of cadmium, without adverse effects on growth." The Quincy, Washington and Tift County, Georgia crop failures were extreme cases: Quincy due to the number and amount of toxic substances applied as fertilizer and Tift County due to a change in soil ph "when some of the farmers stopped liming. Then the heavy metals mobilized like an invading army and hit like a time bomb." WILSON, *supra* note 2, at 178.

[135] HOLDING THE BAG, *supra* note 112, at 10.

[136] 40 C.F.R. § 261.1(c)(5)(ii) (2001).

[137] *See* Requirements for Zinc Fertilizers Made From Recycled Hazardous Secondary Materials: Proposed Rule, 65 Fed. Reg. 70,953, 70,958 (proposed Nov. 28, 2000), *available at* http://www.epa.gov/fedrgstr/EPA.WASTE/2000/November/Day_28/f29876.htm (last visited Mar. 13, 2003) [hereinafter EPA PROPOSED ZINC FERTILIZER RULE].

[138] *See*, *e.g.*, IND. CODE ANN. § 15-3-3-9 (West 2002); MISS. CODE ANN. § 69-24-21 (2002).

Numerous scientific studies have proven that hazardous substances in fertilizer accumulate in soil and food.[139] The hazardous substances described above, and others, have been shown to be harmful to health and welfare as a result of repeated exposure and/or accumulation in the body and the environment. However, there are still substantial uncertainties to be addressed about what dose, if any, is safe. Another unaddressed issue is whether, and how, such uncertainty should be addressed by governmental control.

II

ALTERNATIVE CONTROL LEVELS

A. Overview—Levels of Control

When evaluating whether hazardous substances in fertilizer should be controlled, and if so, to what level, there are three alternatives to consider: (1) no control, (2) standards that allow some level of hazardous substance use, or (3) a complete ban of hazardous substances in fertilizer unless the substance is treated to remove its hazardous characteristic(s). As will be described in Section III, the current scenario at the state level is no control, with the exception of a few states that have implemented some level of control. At the federal level, the current scenario is a combination of standards and no control.

An alternate control levels analysis involves an attempt to balance three quasi-competitive interests: efficiency, equity, and sustainability.

1. Efficiency

The efficiency interest is concerned with whether market mechanisms exist to efficiently allocate resources, such as productive farmland, health, and "raw" fertilizer materials.[140] Market-driven efficiency presumes consumers have perfect information so that meaningful bargaining occurs between parties making rational choices.[141] An efficient outcome is one where the total benefit to society from regulation outweighs the total cost to society from regulation.[142] When market mecha-

[139] *E.g.*, WILSON, *supra* note 2, at 287 notes 8-9.
[140] PLATER ET AL., *supra* note 17, at 115.
[141] Driesen, *supra* note 14, at 552-53.
[142] PLATER ET AL., *supra* note 17, at 116.

nisms do not exist or have failed, government intervention through regulation or taxation may be the most efficient method of achieving efficient resource allocation.[143]

However, efficiency is a human-centric allocation method that is generally unconcerned with non-human factors, such as maintaining a healthy environment.[144] Efficiency also does not take into account equity issues related to the distribution of costs and benefits,[145] nor does it consider sustainability issues.[146] Instead, efficiency is primarily concerned with satisfying current human material desires, discounting future values such as the PBT burden and its resultant effects that will be borne by the environment and in the bodies of future generations.[147]

Where the goal is efficient allocation of the right to use hazardous substances that will enter the food chain and the environment, market mechanisms fail due to three factors: the initial allocation of entitlements is given to the polluter,[148] the disparity in bargaining power between polluters and victims, and the lack of information for pollution victims to use both during the regulation-crafting "bargaining process" and afterward when selecting a product for use.[149]

To evaluate the total cost versus the total benefit requires a determination of economic value for each risk and benefit. Because a regulation's benefits to health, welfare, and the environment are not as clearly quantifiable as the regulation's costs, there has been considerable debate among stakeholders as to how this disparity should be addressed. The balancing outcome may depend on how such unquantifiables are incorporated. Where unquantifiables are given some consideration, standards have been implemented to limit allowable levels of hazardous substances.[150]

It is important to remember that the issue at hand is whether hazardous substances should be banned from fertilizer, not

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[143] *Id*. at 553.

[144] *Id*. at 115.

[145] PERCIVAL ET AL., *supra* note 11, at 20-21.

[146] Driesen, *supra* note 14, at 572.

[147] *See* PLATER ET AL., *supra* note 17, at 115.

[148] *Id.* at 115, n.17.

[149] Driesen, *supra* note 14, at 570.

[150] *See*, *e.g.*, Ethyl Corp. v. EPA, 541 F.2d 1 (D.C. Cir. 1976) (upholding EPA's limits on lead in gasoline where significant harm from leaded gasoline was demonstrated and benefit from the regulations was quantified with scientific certainty).

whether non-hazardous substances should be banned from fertilizer or whether chemical fertilizers should be banned. Regardless of whether the discussion is couched in terms of economic efficiency, utilitarianism, or opportunity cost, the actual tradeoff is between short-term material welfare for hazardous substance generators, fertilizer manufacturers, and farmers who use contaminated fertilizer versus the hazardous substance's "next best" use.

In public and regulatory debates the issue is usually framed in terms of the clearly identifiable economic welfare of hazardous substance generators, the fertilizer industry, and farmers, versus uncertain and generalized environmental degradation.[151] However, framing the issue as industry and farmers versus the environment is a false tradeoff because the benefits from contaminated fertilizer use have been overstated through externalization of significant costs[152] and failure to include, or systematic understatement of some significant and scientifically established harms.[153]

False tradeoffs occur when rational alternatives are available. With contaminated fertilizer, the arguments for a standard greater than zero are posed as false tradeoffs; contaminants must be tolerated in fertilizers to make the fertilizer affordable to farmers,[154] or contaminants must be tolerated in fertilizers from recycled hazardous waste in order to save space in hazardous waste landfills.[155] These are false tradeoffs because rational alternatives exist. Non-hazardous materials are available, and treatment methods are available to render some substances non-hazardous. Also, non-contaminated fertilizers are available, and

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[151] *See, e.g.*, WILSON, *supra* note 2, at 188-98.

[152] PERCIVAL ET AL., *supra* note 11, at 59. Treating the hazardous waste prior to its use in fertilizer is an example of a cost externalized by hazardous waste generators and some fertilizer manufacturers.

[153] Generally, only harm to health from cancer is considered in risk assessments and cost-benefit analyses. This ignores the cost of non-cancer health harms, cost of environmental harms, and other reasonably foreseeable economic harms discussed further in section I.A.2.

[154] *See* WILSON, *supra* note 2, at 22 (nitrogen fertilizer price ranged from 9 cents a pound for "clean" fertilizer, down to 2.5 cents per pound for waste-derived fertilizer). However, an empirical survey by this author at the local hardware store showed no price differential between waste-derived versus non-waste-derived products for home gardeners.

[155] *See* EPA PROPOSED ZINC FERTILIZER RULE, *supra* note 137, at 48396 (noting that allowing K061 waste in fertilizer saved a valuable substance (zinc) from being landfilled).

due to concern about hazardous substances, farmers prefer clean fertilizers even though clean fertilizers *may* cost more.[156] Further, uses other than fertilizer are available for the hazardous waste. Therefore, accepting these false tradeoffs only deflects analysis away from the full economic impact of contaminated fertilizers and hinders development of treatment methods or other uses for hazardous substances that cannot be made harmless.

2. *Equity and Economic Efficiency*

Laws based only on efficiency ignore principles of personal responsibility and the undemocratic power distribution in favor of the polluting entity "to impose its choice about the use of resources on a large class of neighbors without their consent. In this way, rote reliance on normative economic analysis arguably ignores traditional American democratic norms and ideals."[157] "[S]ocial regulation expresses what we believe, what we are, what we stand for as a nation, not simply what we want to buy as individuals. Social regulation reflects public values we choose collectively, and these may conflict with wants and interests we pursue individually."[158]

Current fertilizer manufacturing practices are a classic tragedy of the commons because hazardous substance generators and fertilizer manufacturers externalize their costs for treatment, 'clean' materials, or hazardous landfill disposal. Current regulatory schemes perpetuate this inequitable distribution of benefits and harms, allowing only a few, highly politically organized and powerful industries to receive the benefits of the status quo, while fertilizer users, the public, and the environment bear the costs.[159]

The benefits flow to hazardous substance generators who transform a former waste stream into a revenue stream. Therefore, these generators have little incentive to reduce or treat their waste. Fertilizer manufacturers have a steady supply of low cost materials. Farmers have a lower cost fertilizer option but may be unaware of the true reason for the lower cost.[160] Finally, hazardous waste disposal sites are relieved of this material.

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[156] Aylsworth, *supra* note 116, at 32.

[157] PLATER ET AL., *supra* note 17, at 115.

[158] *Id.* at 118 (quoting Mark Sagoff, The Economy of the Earth 16 (1989)).

[159] *Id.* at 139.

[160] WILSON, *supra* note 2, at 147. The price differential between zinc fertilizer with no lead and zinc fertilizer with 3% lead was 25 cents to 50 cents per acre, or approximately $2,500 for 5,000 acres of potatoes.

The costs of the status quo are borne by a diffuse, politically unorganized, and therefore under-represented public. "Furthermore, it is difficult to organize members of the general public to oppose the imposition of a collective risk because of the 'transaction costs' (e.g., time and money) of participation and the 'free rider problem' (i.e., the human tendency to believe that someone else will solve the problem)."[161]

Such undemocratic distribution of benefits and harms is "justification for governmental intervention in the market system to readjust the distribution of benefits."[162]

3. *Sustainability and the Tragedy of the Commons*

Sustainability considers the intergenerational effect of current production practices, asking whether current practices will leave future generations "at least as much productive capacity as this generation inherited."[163] Sustainability is considered from two perspectives: the effect of current practices on multi-generational sustainability of (1) the quantity of production, and (2) the quality of health and the environment.

[N]o account is taken of the costs imposed by pollution or by a nation's dwindling stock of natural resources. These omissions constitute a fundamental inconsistency, because the output measured to make up GNP does take account of the depletion of other capital resources, such as the depreciation of plant[s] and equipment.[164] If natural resources were considered to be a form of scarce capital, and valued as such, however, it would routinely be the case that economic evaluations of actions that threatened serious environmental damage would have to be assigned larger costs than they do under present, more conventional, economic standards.[165]

Herman Daly, a former senior economist for the World Bank,[166] offers three suggestions for general economic sustainability, which also would support environmental sustainability when applied to banning hazardous substances in fertilizer. First, "[s]top counting the consumption of natural capi-

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[161] PLATER ET AL., *supra* note 17, at 139.
[162] *Id.* at 118.
[163] *Id.* at 121.
[164] *Id.*
[165] *Id.* at 123.
[166] From 1988 to 1994.

tal as income."[167] In other words, stop counting the "gross" value of land as income rather than the "net" value after it is "spent down" through application of persistent hazardous substances.[168] Second, "tax throughput more. Throughput means flows of energy and materials from the earth through the economy, and back as waste to the earth. It makes no sense . . . to tax what you want (income, capital gains) instead of what you want less (depletion, pollution)."[169] Third, "[m]aximize the productivity of natural capital and invest in increasing it."[170] The productivity goal is increased production of wholesome foods to feed a growing population. Contaminating farmland with hazardous substances that accumulate and persist for decades or centuries decreases productive capital. Thus, hazardous substance-bearing fertilizers should at least be taxed higher than clean fertilizers.

The current practice of no regulation for some hazardous substances and limited regulation for others appears to have evolved from two factors. First, reliable scientific analysis was not available to prove that some substances were hazardous, that plants took up the substances, and that the substances accumulated as they moved up the food chain. Second, based on this lack of data, politically and financially powerful industries were able to prevent controls from being implemented.[171]

However, now that the harms and causal chain have been sufficiently proven, it is possible to show, as the following sections argue, that nothing short of a total ban of hazardous substances in fertilizer is acceptable. A total ban is the only option that re-

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[167] PLATER ET AL., *supra* note 17, at 123.

[168] *See* J. Bouma, Soil Environmental Quality: A European Perspective, 26 J. ENVTL. QUALITY 26, 30 (1997) citing Van Dieren et al. (1995) calling for economists to include:

> hidden environmental costs when calculating the economics of national products . . . [pointing] out that when agricultural production is associated with pollution of soil and water, only the economic yield of produce is considered while the hidden cost associated with cleaning up the pollution is ignored. Even more absurd, any costs associated with the application of techniques for cleaning up such pollution at a later date, is considered to be yet another welcome addition to the national economic product, while it should really have been subtracted from the original national product.

Id.

[169] *Id.*

[170] *Id.*

[171] *See* WILLIAM H. RODGERS, JR., 4 ENVIRONMENTAL LAW: HAZARDOUS WASTES AND SUBSTANCES § 7.9, 78 (West 1992) [hereinafter RODGERS TREATISE].

spects commerce, property rights, the environment, and an individual's right to be free from involuntary toxic exposure.

B. Do Nothing

When considering alternative courses of action, to do nothing is always an alternative. Yet, due to the potential harms from widespread use of hazardous fertilizers, doing nothing may only be justified in cases where the causal chain has not been sufficiently proven. However, the causal chain has been sufficiently proven to work in the following way. First, substances are used in fertilizer that, but for an exception in existing law, would be considered hazardous waste. Second, with few exceptions, the identity and quantity of substances is undocumented or unavailable to the fertilizer's user. Third, the fertilizer is sold for unrestricted use on food and fodder crops, as well as ornamental and recreational plants, thus increasing exposure through inhalation and dermal contact. Fourth, credible scientific proof exists that many types of plants take up hazardous substances, thus increasing exposure through ingestion. Fifth, exposure is compounded due to the persistent nature of PBTs and many heavy metals. Sixth, exposure is compounded by the fertilizer's contamination of air (from windblown particles) and water (from runoff and ground water seepage). Seventh, many hazardous substances have been confirmed to a reasonable medical certainty to cause a variety of serious harms to humans and animals. Finally, these exposures potentially affect every person in the United States.

Where the harm to everyone, including future generations, outweighs the benefits for a few, perpetuating the status quo fulfills none of the societal norms of efficiency, equity, or sustainability. Therefore, another alternative must be considered.

C. Implement Standards

Implementing standards would set limits on the amount and type of hazardous substances allowed in fertilizer. The EPA has set treatment standards for some types of waste prior to the waste's disposal on the land. However, as will be discussed later, these standards do not, and will not for the foreseeable future, accomplish RCRA's goal of protecting peoples' health and the environment from harmful disposal practices. Instead, the treat-

ment standards increase the total potential risks from contaminated fertilizer.

A standard that allows some amount of hazardous substances in fertilizer is not acceptable because the benefits do not outweigh the harms. Before limiting a current practice, the proposed standards must be legally defensible. The EPA, the U.S. Food and Drug Administration, and state agencies require three key elements when setting standards for hazardous substances: risk assessment, alternatives assessment, and cost-benefit analysis.

There are three problems with the current approaches to hazardous substance control. First, the burden is on the challenger to prove that the harms from a substance outweigh the benefits, and such proof often requires a level of certainty that may be impossible to attain.[172] Second, the standards are based on the effects of only one substance at a time, rather than the more probable scenario of exposure to multiple substances.[173] Third, the standards focus on "end-of-pipe controls" instead of reduction at the source.[174]

The regulatory schemes most commonly used by the EPA to control human and environmental exposure to hazardous substances are harm-based, technology-based, or a combination of both. The Water Pollution Control Act[175] and the Clean Air Act[176] use these approaches, and RCRA uses a solely technology-based approach. From these schemes we may draw conclusions about the efficiency and the effectiveness of implementing either regulatory scheme.

1. Harm-based Standards and the Inefficiency of Risk Assessments: Inherent Flaws When High Uncertainty Exists

Harm-based standards take an extremely long time to determine, due in large part to the complexity of the risk assessment analysis. Once standards are set, the risk assessment's inherent weaknesses opens the standards to criticism both by proponents

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[172] Kuehn, *supra* note 38, at 113.

[173] STOLEN FUTURE, *supra* note 10, at 220.

[174] VISUALIZING ZERO, *supra* note 44, at 9.

[175] Clean Water Act, 33 U.S.C.A. §§ 1251-1377 (West 2001).

[176] Clean Air Act, 42 U.S.C.A. §§ 7401-7671 (West 2001).

of controls, who claim the standards are underprotective, and by opponents, who claim the standards are overprotective.

Uncertainty makes the risk assessment's risk-characterization meaningless while giving the appearance of objective validity. Further, the complexity and inaccessibility of a risk assessment's assumptions hinders meaningful public participation in the standard-setting process.[177] The resulting debate over the assessment's validity delays finding a solution and undermines the industry's and the public's reliance on a solution based on risk assessment. Therefore, understanding the weaknesses inherent in risk assessments is critical to understanding that the allowance of hazardous substances in fertilizers is unacceptable when the regulatory standards are based on the results of a risk assessment.

a. Risk Assessments and Uncertainty

"[R]isk assessment is a quantitative estimate of the chance that a person will be stricken with cancer or other serious illness over the course of that person's lifetime due to exposure to a chemical substance."[178] The risk assessment process has been described as a method of generating "scientific information" in a manner that is "credible, objective, realistic, and balanced," and without consideration of "non-scientific factors."[179] However, in actuality, each step in the risk assessment process is laden with scientific uncertainty[180] and subjective, value-laden policy choices that are

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[177] Kuehn, *supra* note 38, at 129.

[178] Mark Eliot Shere, *The Myth of Meaningful Environmental Risk Assessment*, 19 HARV. ENVTL. L. REV. 409, 412 (1995). Mr. Shere presents an excellent analysis of the weaknesses in the risk assessment process and the resulting risk characterization's value for use in risk management. However, I strongly disagree with Mr. Shere's conclusion that regulators should "separate the protection of public health (the sole consideration in risk assessment) from other issues in environmental regulation." *Id.* at 492. This is an overly formalistic view of EPA's and Public Health official's roles and expertise. Such separation of duties is more likely to foster information gaps that make both agencies less effective.

[179] *Id.* at 412 (quoting EPA RISK ASSESSMENT COUNCIL, GUIDANCE FOR RISK ASSESSMENT 4 (Nov. 1991)).

[180] *Id.* at 413.

made to address the uncertainty.[181] These choices may severely skew the results.[182]

Risk assessments include four main steps, almost all of which are "plagued by inadequate data."[183] The first step is hazard identification, which asks whether a substance is causally linked to a particular health effect. The second step is dose-response assessment, which attempts to scientifically establish the probability of a response from given dose levels. The third step is exposure assessment, which determines the human and environmental exposure levels to the substance. The fourth step is risk characterization, which, using the results from the previous steps, determines the overall magnitude of the risk.[184]

The first step, hazard identification, occurs when either field or laboratory observations of adverse health effects are scientifically, but not necessarily legally, causally linked to a particular substance. The difficulty lies in establishing a causal connection between a single substance, isolated from the multitude of other substances present in the test population, and a harmful effect, such as cancer.[185] Cancer is the primary hazard studied in risk assessments, but there is great uncertainty due to many cancers' long latency periods and uncertainty regarding cancer's manifestation process.[186] Due to the overwhelming focus on cancer, identification of other hazards, such as endocrine disruption, has only recently been included in risk assessments. However, the causal connection is a bit easier to draw because the endocrine system processes are better understood than cancer manifestation processes.[187]

The second step, dose-response analysis, is usually based on extrapolations from animal studies, due to the lack of relevant

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[181] *See id*. at 416; *see* also PERCIVAL ET AL., *supra* note 11, at 509-10 (comparing, under President George Bush, Sr., the Office of Management and Budget's critique of "conservative (worst-case) assumptions" in EPA's risk assessments versus the Center for Risk Analysis at the Harvard School of Public Health claim that risks were underestimated due to the risk assessment analyst's choice to limit exposure pathways, the hazards included, and to treat substances individually rather than consider synergistic effects).

[182] PERCIVAL ET AL., *supra* note 11, at 509 (quoting Office of Management and Budget); *see also* Shere, *supra* note 178, at 413.

[183] Shere, *supra* note 178, at 429.

[184] *Id*. at 430.

[185] *Id*.

[186] *Id*.

[187] STOLEN FUTURE, *supra* note 10, at 168-69.

human epidemiological data. Dose-response results derived from animal studies are criticized on three grounds. First, animal studies are not conducted at enough dose levels to determine the threshold level or the dose-response curve's shape.[188] Second, the model to extrapolate the dose-level from the test animal to humans is uncertain. Third, the model to extrapolate the animal's biological mechanisms to that of humans is uncertain. "As a result, perhaps no area of risk assessment involves greater uncertainty and controversy than the judgments necessary to extrapolate dose-response associations from animals to humans and from high doses to low doses."[189]

The third step, the exposure assessment, attempts to determine how much of the hazardous substances will reach people through various exposure pathways.[190] "Exposure assessment also is a source of uncertainty and controversy, because often little is known about the fate and transport of chemicals in the environment and there may be wide variability of exposures between individuals and disagreements about how to define typical or maximum exposures."[191]

The fourth step, the risk characterization, multiplies the dose-response rate by the exposure rate to present a quantitative estimate of the number of people "likely to experience the adverse effect or the likelihood that any one individual exposed to the hazard would suffer the adverse effect."[192]

Where regulations have set standards for hazardous substances in fertilizer, the agencies relied on three risk assessments: the EPA's Fertilizer Risk Assessment, the California Department of Food and Agriculture regulatory study (CDFA), and The Fertilizer Industry's study (TFI). All of these risk assessments demonstrate the uncertainty, the subjective value-laden assumptions used to address the uncertainty, and the resulting distrust by all stakeholders of the risk characterization. Public distrust is expressed by criticisms that mathematical modeling does not resemble real life, and that only a limited set of harms were considered.

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[188] *Id.*

[189] Kuehn, *supra* note 38, at 113.

[190] Shere, *supra* note 178, at 440.

[191] Kuehn, *supra* note 38, at 114.

[192] PERCIVAL ET AL., *supra* note 11, at 427.

The disconnect between mathematical modeling and real life has been explained in the following way.

> Because of the enormous complexity and variability inherent in fertilizer application, soil accumulation, plant-uptake and other exposure pathways, this modeling must resort to the use of averages, numerous assumptions, and vast over-simplifications of real-world biological and ecosystem processes. By relying on assumptions and averages, this model gives the appearance of quantifying the data with some precision that is wholly unjustified.[193]

Each of the studies analyzed effects for only a limited number of hazardous substances, thus missing the individual and synergistic effects from substances not included in the study. The CFDA study evaluated the risk from only three metals: arsenic, cadmium, and lead.[194] The EPA risk assessment did a little better, by using nine metals[195] and seventeen cogeners.[196] No risk assessments evaluated the risks posed by dioxins.[197] To put this deficiency into perspective, Washington State's screening of metals in fertilizer found twenty-six metals, plus dioxins, in fertilizers sampled in January of 1998.[198]

The types of exposures or exposure pathways that are evaluated must be increased to reflect real life exposures. For example, the CFDA risk assessment only included commercial

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[193] CALPIRG, CRITIQUE OF THE CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE'S PROPOSED "RISK-BASED" STANDARDS FOR REGULATING TOXIC MATERIALS IN INORGANIC FERTILIZER 3 (June 18, 1999), *at* http://www.pirg.org/calpirg/enviro/fertilizer/critique.html (last visited Oct. 27, 2001) (on file with author) [hereinafter CALPIRG CRITIQUE].

[194] *Id.* The risk assessment does not evaluate the risks posed by other metals that are found in fertilizers, such as mercury, molybdenum, nickel, selenium, copper, or zinc. *Id.*

[195] Cadmium, lead, arsenic, chromium, mercury, nickel, vanadium, copper, and zinc.

[196] OFFICE OF SOLID WASTE, U.S. ENVIRONMENTAL PROTECTION AGENCY, ESTIMATING RISK FROM CONTAMINANTS CONTAINED IN AGRICULTURAL FERTILIZERS 2-1 (1999). A cogener is "[a]ny of two chemical substances composed of the same elements in the same proportions but which have different properties because of different structures. Dioxins and PCBs have many cogeners." Georgia Institute of Technology, South and Southwest Hazardous Substance Research Center, *Glossary of environmental engineering definitions*, *at* http://www.wrhsrc.orst. edu/glossary.htm (last visited Mar. 5, 2003).

[197] CALPIRG CRITIQUE, *supra* note 193.

[198] SCREENING SURVEY, *supra* note 114, at Appendix 1-L. Aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, potassium, selenium, silver, sodium, strontium, thallium, titanium, vanadium, zinc, mercury and dioxin.

farming. "This risk assessment does not evaluate other potential avenues of human exposure to the three metals, such as manufacturing and processing of parent materials, handling by retail distributors, and non-commercial use, such as lawn and garden use"[199] or exposure from recreational use in parks and golf courses. The EPA risk assessment only considered the effect on a farm family (an adult and a child), and the only exposure was through plant ingestion. The EPA study assumed that farmers would have the highest exposures, and therefore the results would be the "worst case scenario."[200] This assumption is not necessarily correct for exposure to endocrine-disruptors, where the timing of exposure, not the dose-level or number of exposures, is critical.[201]

The number, type, and purpose of fertilizers studied must be more representative. The EPA and CDFA studies used only fertilizers intended for agricultural use. However, the Washington State study included fifty fertilizers from agricultural use, macro- and micro-nutrient, home use, and soil amendments.[202] Washington State's analysis of fertilizer contaminants showed seven of the fifty fertilizers tested exceeded the statutory limit (four of the seven were for home gardener use).[203] This discrepancy has implications for the exposure assessment step because home gardeners are less likely to follow safety precautions and exceed recommended application rates.[204] Further, residential-use fertilizers may be applied where children play, thus increasing both the likelihood of exposure and an exposure dose greater than the estimates in the States' evaluations.[205]

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[199] CALPIRG CRITIQUE, *supra* note 193.

[200] OFFICE OF SOLID WASTE, U.S. ENVIRONMENTAL PROTECTION AGENCY, ESTIMATING RISK FROM CONTAMINANTS CONTAINED IN AGRICULTURAL FERTILIZERS 1-2 (1999).

[201] STOLEN FUTURE, *supra* note 10, at 252-53.

[202] SCREENING SURVEY, *supra* note 114. In addition, the Minnesota Department of Health evaluated 81 fertilizer products licensed for sale and use in Minnesota but screened for only arsenic, cadmium, and lead. MDH FERTILIZER EVALUATION, *supra* note 78.

[203] *Id.* Because Minnesota's Department of Health has not set either risk-based or soil-level-based standards for metals in fertilizer, the screening report compared screening results to California's risk-based standards and Washington's soil-level-based standards. Three products sold for home use exceed both standards. MDH FERTILIZER EVALUATION, *supra* note 78, at 7.

[204] MDH FERTILIZER EVALUATION, *supra* note 78, at 5.

[205] *Id.*

Another problem with risk assessments is that they do not account for the full range of harms. EPA generally does not investigate a practice for possible regulation until deaths from *cancer* exceed a certain level.[206] Once an investigation has commenced, the risk assessment usually includes only a limited type of risk, usually the risk of death from cancer.[207] However, heavy metals and dioxins produce significant harms that are not included in the risk assessments. As noted previously, some significant known harms from metals and dioxins that are not included in risk assessments of contaminated fertilizer include sterility, malformation of reproductive systems and other intergenerational harms, nervous disorders, and lowered intelligence. None of the risk assessments included harm to the environment, such as accumulation in soils or runoff to water.[208]

b. *Risk Assessment's Inaccessibility by the Public and the Public's Reaction*

The complexity and inaccessibility of risk assessments' assumptions hinders the public's participation in the process.[209] The difference between the EPA's and the public's ranking of their top environmental concerns demonstrates this division.[210] Ironically, the EPA's reliance on risk assessments increased dramatically in the early 1980s as a way to restore the public's confidence in the EPA's scientific credibility and decision-making procedures. The EPA's reliance on risk assessements also served to slow regulatory advance to a crawl due to paralysis-by-analysis.[211] As a result, the EPA is in a defensive position. EPA officials and risk producers have come to view "the risk assessment process as part of the 'decide-announce-defend' approach to environmental

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[206] PERCIVAL ET AL., *supra* note 11, at 384, 400 [emphasis added].

[207] The Science and Environmental Health Network, *Frequently Asked Questions*, *at* http://www.sehn.org/ppfaqs.html (last visited Mar. 5, 2003).

[208] The CFDA study "does not attempt to characterize the ecological risks posed [by] releasing heavy metals in agriculture or even the agronomic effects of permitting these contaminants to accumulate in farm fields. According to an analysis by [California Department of Toxic Substance Control], the proposed risk-based levels for cadmium and lead in fertilizer may result in a 2 to 4 fold increase in equilibrium soil concentration for these contaminants as they accumulate over decades. . . . The impact of this heavy metal burden on plants including crop health and productivity, and other non-plant organisms is not even considered by the study." CALPIRG CRITIQUE, *supra* note 193.

[209] *See id.* at 130.

[210] *Id.* at 127.

[211] Kuehn, *supra* note 38, at 111.

problems—the experts and agency officials decide, the agency announces its decision, and then defends it against attacks by the persons who must bear the risks."[212]

In sum, a regulatory scheme relying on risk assessment to control hazardous substances in fertilizer is inappropriate for the following reasons: the risk assessment's flawed methodology when high scientific uncertainty exists, the complex process excludes meaningful public input, procedures intentionally skew participation in favor of risk producers, citizens lack confidence in the risk assessment's results, and the tremendous time required to produce the risk assessment.

2. *Technology-based Standards and the Inequity of Cost-Benefit Analysis*

Technology-based standards used in regulatory schemes are based on a cost-benefit analysis, not a risk assessment.[213] Cost-benefit analysis is also a fundamentally flawed tool for guiding government action intended to achieve long-term efficiency, equity, or sustainability.[214] Congress recognized this deficiency by explicitly prohibiting cost-benefit balancing in some statutes employing harm-based standards.[215]

Avoiding significant harm to the health of people currently alive, as well as future generations, is the primary benefit of banning hazardous substances in fertilizer. Using a cost-benefit analysis to determine whether the costs of regulation are worth the benefits raises several concerns when it is used to decide a hazardous substance standard, especially a PBT standard.

a. *Cost-Benefit Analysis is Based on Incomplete, Inconclusive, or Biased Data*

"Soft" factors such as the health of people and of the environment are notoriously difficult to quantify.[216] Data is either not available or cannot be obtained at a reasonable cost.[217] Therefore, administrative agency analysts tend to undervalue or ex-

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[212] *Id.* at 160.

[213] For example, the Clean Water Act's Best Achievable Technology (BAT) standards 33 U.S.C. § 1311(b)(2)(A) (2001).

[214] Driesen, *supra* note 14, at 558-60.

[215] For example, the Clean Air Act's harm-based standards intended to protect the public health. 42 U.S.C. § 7409(b)(1) (2000).

[216] Driesen, *supra* note 14, at 558 n.55.

[217] *Id.* at 559 n.58.

clude these factors.[218] Cost data is often provided by the regulated industry in question, who has a stake in the outcome, so one may expect to encounter biased information from these sources.[219] Consequently, the result of the cost-benefit analysis is an unreliable basis for regulatory decision-making,[220] especially when lives hang in the balance.

b. Cost-Benefit's Presumption of the Harm Producer's Entitlement Offends Societal Norms

When cost-benefit analysis is used to regulate hazardous substances, the analytical result is a decision whether a polluter will be allowed to continue harming, even killing, because a mathematical equation determined it is cheaper than stopping the harmful activity.[221]

The puzzle is that we do not allow this kind of cost-benefit balancing in all life-threatening contexts. Yet when it comes to regulatory programs that prevent deaths—deaths also due to the actions of other people—it has become commonplace to argue that the people doing the harm should be allowed to act so long as it would cost more for them to stop doing the harm than the harm is worth in monetary terms.[222]

This value judgment offends the legal and societal norm that we have a duty to not harm others.[223] As a method of determining who may legally be harmed, a cost-benefit analysis establishes that some people will be "expendable victims."[224] These victims are not usually consulted or informed thereby violating the legal and societal norm of informed consent.

Legislators accept the results of a cost-benefit analysis because the analytical process transforms the lives at stake into "statistical persons" who are not people "at all, but rather only a collec-

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[218] Driesen, *supra* note 14, at 558, nn.54-55. *See also* Corrosion Proof Fittings v. EPA, 947 F.2d 1201, 1218 (5th Cir. 1991) where the court criticized the EPA for not quantifying future benefits. The court also criticized the EPA's comment that it could have documented greater benefits but chose to be conservative.

[219] Thomas O. McGarity, *Regulatory Analysis and Regulatory Reform*, 65 TEX. L. REV. 1243, 1284 (1987).

[220] *Id.* at 1298.

[221] Lisa Heinzerling, *The Rights of Statistical People*, 24 HARV. ENVTL. L. REV. 189, 189 (2000) [hereinafter *Statistical People*].

[222] *Id.*

[223] *See* Driesen, *supra* note 14, at 562 n.73.

[224] *Statistical People*, *supra* note 221, at 199.

tion of risks."[225] These "statistical persons" are no one that we know, which allows us "to sidestep the uncomfortable fact that most of us profess ourselves quite incapable of identifying the monetary equivalent of the lives of our sisters, daughters, mothers, and friends."[226] By speaking in terms of statistical persons, legislators, like army generals during war, attempt to determine the "acceptable" level of losses. Thus, a cost-benefit analysis as a method of determining who is expendable offends societal norms of autonomy and informed consent.[227]

c. *Decisions Based on Current Consumer Preferences Underrepresent Future Citizens' Preferences*

A cost-benefit analysis as a decision-making tool for legislation preventing long-term harm is inappropriate because the more years included in the estimate, the more inherently inaccurate the result becomes. The result is inaccurate in two ways. First, it assumes that future consumers will continue to make the same choices as current consumers, even though the regulation at issue would produce improved information and product prices that reflect internalization of pollution costs. Second, it fails to consider the increasing value of uncontaminated farmland as a scarce resource. "Usually the short-term costs of regulation receive more consideration than the long-term costs of possible harm—and the public is left to deal with the damages."[228]

"[T]he standard 'discount rate' that assesses costs and benefit flows resulting from the use or development of natural resources routinely assumes that all resources belong to the present generation." In the words of Herman Daly, "[T]here is something fundamentally wrong in treating the earth as if it were a business in liquidation."[229] Such favoritism in current practices may be seen even in the Washington State fertilizer control statute, one of the most stringent fertilizer controls in the United States. The Washington State contamination standards were set to allow a doubling of soil contamination in forty-five years.[230] Therefore, the

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[225] *Id.* at 189-90.

[226] *Id.*

[227] The Science and Environmental Health Network, *Frequently Asked Questions at* http://www.sehn.org/ppfaqs.html (last visited Mar. 5, 2003).

[228] *Id.*

[229] Richard L. Revesz, *Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives*, 99 COLUM. L. REV. 941, 945 (1999).

[230] *See* WASH. REV. CODE § 15.54.800 (2002).

current practices will decrease the amount and quality of farmland over the next one to two generations; the same time that a growing population simultaneously increases the demand for farmland.

d. Discounting Future Benefits to Net Present Value Virtually Assures Benefits Will Not Exceed Costs

Some harms from exposure to toxic substances may occur after a long latency period or after multiple small doses.[231] Effects of endocrine disruption may not appear until the next generation.[232] Therefore, most benefits from banning hazardous substances in fertilizer will be realized many years in the future.[233] Standard practice in a cost-benefit analysis is to discount all future costs and benefits to net present value using a "discount rate"[234] where the chosen discount rate is outcome determinative.[235]

[T]he basic arithmetic of exponential growth applied in a cost-benefit analysis implies that, regardless of how small the cost today of preventing an environmental catastrophe that will eventually wipe out the entire economy, it would not be worth this cost to the present generation if the benefits in the future are sufficiently distant.[236]

Congress recognized that discounting to the net present value "would prevent EPA from regulating any carcinogen with a long latency period . . . and urged EPA to reject the use of discounting over the latency period of diseases caused by chronic hazards."[237]

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[231] Revesz, *supra* note 229, at 941.

[232] *See* STOLEN FUTURE, *supra* note 10, at 169 (noting that although the drug DES caused no adverse effects to women given the drug while pregnant the drug caused a variety of harms to their children).

[233] McGarity, *supra* note 219, at 1296.

[234] *Id.* at 1295.

[235] *Id.* at 1295-96.

[236] Revesz, *supra* note 229, at 947 n.22 (quoting Robert C. Lind, *Reassessing the Government's discount Rate Policy in Light of New Theory and Data in an Economy with a High Degree of Capital Mobility*, 18 J. ENVTL. ECON. & MGMT. S-8, S-20 (1990)).

[237] *Id.* at 951. "[S]ubcommittee of the U.S. House of Representatives chastising OMB for its insistence on discounting the value of human lives." Statement refers to testimony by Don Clay, Director of the EPA's Office of Toxic Substances. *Id.*

e. Discounting the Value of Human Lives Offends Societal Norms

The regulatory requirement that a cost-benefit analysis discount all benefits, including human lives and health, to the net present value offends social norms by privileging the interests of current generations over future generations,[238] and by defining future lives as less valuable than current lives.[239]

Supporters of discounting argue that all costs and benefits must be discounted in order to make an "apples-to-apples" comparison.[240] Opponents of discounting argue that "lives saved in the future are no less valuable than lives saved in the present. As a result, they argue that discounting is inappropriate."[241] New Hampshire Senator "Jack" Barnes (Republican)[242] expressed this ethical issue succinctly during his Senate confirmation hearings: "I have a great deal of ethical difficulty with a concept of applying a discount factor to human life. The lives of my three children are worth every bit as much to me 10 years from now as they are now."[243]

D. A Total Ban, or "Zero Tolerance" Standard

This Article's proposed ban of hazardous substances in fertilizer provides the best solution when assessed under the principles of efficiency, equity, and sustainability. There is a growing consensus among state, national, and international lawmakers in favor of the elimination of PBTs.[244] A ban on recycling PBT-

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[238] *Id.* at 941.

[239] *Id.* at 944.

[240] *Corrosion Proof Fittings*, 947 F.2d at 1218.

[241] Revesz, *supra* note 229, at 944.

[242] "Senator Jack Barnes, a Republican, was re-elected to the New Hampshire Senate in November, 2000 after previously serving six years from 1992-1998. Prior to being elected to the Senate in 1992, Barnes served two terms in the New Hampshire House of Representatives. He serves on the Banks, Public Affairs, and Environment Committees." New Hampshire State Senate Roster, *available at* http://www.gencourt.state.nh.us/senate/members/senate17.asp (last visited Mar. 12, 2003).

[243] Revesz, *supra* note 229, at 951 and n.35. "Subcommittee on Oversight and Investigations of the House Committee on Energy and Commerce, EPA's Asbestos Regulations: Report on a Case Study on OMB Interference in Agency Rulemaking, reprinted in Menell & Stewart, *Environmental Law and Policy* at 111." *Id.*

[244] VISUALIZING ZERO, *supra* note 44, at 8. "The International Joint Commission on the Great Lakes and the Puget Sound/Georgia Basin International Task Force have both called for phaseouts. The United Nations is negotiating an international protocol to phase out 12 of the most toxic PBTs. The U.S. Environmental Protection Agency (EPA) is addressing these same 12 PBTs in its own Initiative. EPA

containing waste into fertilizer would be consistent with several international treaties currently in the process of negotiation and/or ratification.[245] Under this proposal, a material treated to remove the hazardous substance may be used in fertilizer since it would no longer contain the hazardous substance.

1. Uncertainty in Human Health Effects Leads to the Precautionary Principle

When investigating the effects of toxic substances on humans, animals, and the environment, little data is universally agreed upon. Significant disagreement exists among experts as to what level of exposure, if any, is safe.[246] Further, fertilizers containing hazardous substances are not required to be so labeled.[247] As a result, consumers do not know which fertilizers are contaminated.[248] This level of uncertainty about fertilizer content and the effects of contaminated fertilizer makes it almost impossible for an injured person to trace the injury back to the source. The Precautionary Principle is best applied in this type of situation where there is high uncertainty and a potentially high cost of proceeding on a false negative.[249]

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announced in September 1999 that all Great Lakes states would be required to phase out "mixing zones" for PBTs within 10 years (with some exceptions), and called on other states to follow this lead. Mixing zones are areas around discharge pipes where polluters are allowed to exceed water quality standards. These zones are often quite large. Following Washington State's lead, Oregon has also launched a PBT Initiative." *Id.*

[245] BNS, *supra* note 19; POPs, *supra* note 19.

[246] *See* WILSON, *supra* note 2, at 173-75.

[247] Washington State requires the label to carry a message that refers the consumer to the state's website where the metals content, as reported on the license application, may be accessed. WASH. REV. CODE § 15.54.340 (2002).

[248] After screening eighty-one fertilizers licensed for sale and use in their state, Minnesota's Department of Health recommended

> [l]abels of micronutrient and phosphate fertilizers available to consumers should be reviewed to determine if the information is complete, accurate, and understandable. Labels also should be evaluated to determine if the precautions are consistent with the concerns identified in this evaluation. If these labels are not satisfactory, the manufacturer should be notified that the product will no longer be registered for sale in Minnesota.

MDH FERTILIZER EVALUATION, *supra* note 78, at 8.

[249] *See* PLATER ET AL., *supra* note 17, at 138-39 (quoting Talbot Page, *A Generic View of Toxic Chemicals and Similar Risks*, 7 ECOLOGY L.Q. 207 (1978)).

2. *The Precautionary Principle and its Adoption by Existing Statutory Schemes*

Equitable principles call for the producer of a harm to bear the cost of mitigation or remedy. "When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof."[250]

The Clinton administration's Council for Sustainable Development "established the Precautionary Principle as one of its guiding principles,"[251] which would have shifted the focus from assessing end product hazards to finding better, cleaner, and safer inputs and production methods.[252] Proponents of the Precautionary Principle claim that cost internalization is an incentive to develop better or more cost-effective treatment methods.[253] Adopting the Precautionary Principle:

> would shift the burden of proof from the public to proponents of a technology. The principle would ensure that the public knows about and has a say in the deployment of technologies that may be hazardous. Proponents [of a new product] would have to demonstrate through an open process that a technology was safe or necessary and that no better alternatives were available.[254]

Although commentators have claimed that decision-making based on the Precautionary Principle will produce irrational results due to "insufficient attention to costs and benefits,"[255] it is the foundational principle for several food quality and environ-

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[250] *The Precautionary Principle,* Rachel's Environment and Health Weekly #586 (Feb. 19, 1998), *at* http://www.rachel.org/bulletin/index.cfm?St=3 (last visited Sept. 23, 2003).

[251] Physicians for Social Responsibility, *Environment and Health Program: Resolutions*, *at* http://www.psr.org/precprinc.html (last visited Oct. 28, 2001) (citing President's Council on Sustainable Development. Sustainable America: A New Consensus for Prosperity, Opportunity and A Healthy Environment for the Future, We Believe Statement, #10, February, 1996, *at* http://clinton2.nara.gov/PCSD/Publications/TF_Reports/amer-believe.html (last visited Sept. 23, 2003)).

[252] The Science and Environmental Health Network, *at* http://www.sehn.org/ppfaqs.html (last visited Mar. 5, 2003).

[253] Robert Costanza, *Three General Policies to Achieve Sustainability*, *at* http://dieoff.com/page87.htm (last visited Mar. 5, 2003).

[254] The Science and Environmental Health Network, *supra* note 255.

[255] Mark Geistfeld, *Implementing the Precautionary Principle*, 31 ENVTL. L. REP. 11326 (Nov. 2001).

mental regulations. For example, pesticide regulations under the Federal Insecticide, Fungicide, and Rodenticide Act,[256] the Federal Food, Drug, and Cosmetic Act,[257] several states' Food and Drug Quality regulations, California's Proposition 65,[258] and the United Nations Treaty on Persistent Organic Pollutants all place the burden on industry to prove safety.

California's Proposition 65, formally titled the Safe Drinking Water and Toxic Enforcement Act of 1986,[259] is a case in point of the benefits to be derived by employing the Precautionary Principle. Proposition 65 expressed the public's concern that toxic control laws are not tough enough and that producers of toxic products do not provide sufficient notice to consumers.[260] The statute established a new incentive structure for toxics regulation in an attempt to end the regulatory paralysis affecting conventional approaches to hazard identification, risk assessment, and enforcement.[261] Proposition 65 shifted the burden of proof in the regulatory process from government to industry. If a manufacturer uses chemicals known to cause cancer or reproductive toxicity, government agencies may no longer treat that use as "innocent" until proven "guilty." Identified hazards are placed on a list and automatically become subject to the Act's warning requirements (twelve months after listing) and discharge prohibition (twenty months after listing). Exemptions from these requirements are allowed only if the business responsible for an exposure or discharge can demonstrate that the amount of chemical in question poses "no significant risk." Consequently, businesses have an economic incentive to avoid using listed chemicals or to keep exposures and discharges below levels that would pose any significant health risk. Also, businesses and the government have a legal incentive to reach agreement quickly on the regulatory levels governing exemption from the law.[262]

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[256] Section 1(a) of Act June 25, 1947, c. 125, as added by Pub.L. 92-516, § 2, Oct. 21, 1972, 86 Stat. 973 (see 7 U.S.C. § 136 (2001)).

[257] 21 U.S.C. § 346 (2001).

[258] CAL. HEALTH & SAFETY CODE § 25249.5 (1986).

[259] *Id.*

[260] William S. Pease, *Identifying Chemical Hazards for Regulation: The Scientific Basis and Regulatory Scope of California's Proposition 65 List of Carcinogens and Reproductive Toxicants*, *at* http://www.fplc.edu/RISK/vol3/spring/pease.htm (last visited Mar. 12, 2003).

[261] David Roe, *An Incentive-Conscious Approach to Toxic Chemical Controls*, 3 ECON. DEV. Q. 179-187 (1989).

[262] Pease, *supra* note 260.

A key provision streamlined the substance listing procedure when the California Scientific Advisory Panel (SAP) agreed to accept hazard identification decisions made by other governmental bodies with expertise in toxics analysis.[263] This decision allowed faster and less expensive listing because it precluded lengthy and redundant analysis. It also avoided protracted legal challenges to each substance's listing.

III

ALTERNATIVE GOVERNMENT IMPLEMENTATIONS

Fertilizer control has traditionally been exclusively a state function, in which the federal government has not played a role. This section discusses federal versus state implementation of a "Zero Tolerance" standard and concludes that state implementation is the best solution.

A. Existing Federal Controls

Under the United States dual sovereignty model, this Article's proposed ban could be implemented at the federal level, at both the federal and state level, or at the state level only. However, to achieve the ban at either level, lawmakers must establish the statutory intent to achieve zero tolerance before the lead agency promulgates clarifying and implementing regulations. The statute's text must make clear that the regulatory scheme places the burden of proof on the manufacturer to show that the fertilizer is not hazardous. If legislation is at the federal level, it must also be a constitutional expression of federal power under the Commerce Clause.[264] Alternately, a state-only scheme, or a dual federal and state scheme, must pass constitutional muster under the federal Dormant Commerce Clause doctrine.

Grounding the ban in a statute affects how quickly the ban may be implemented and the scope of the ban. Three factors affect the speed of a statute's passage. The first factor is whether an existing statute can be amended or whether the statute must be crafted from scratch. The second factor is the statute's significance relative to other legislation. The third factor is the political

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[263] *Id.* Proposition 65 authorizes the SAP to list substances identified as hazardous by the EPA, the International Agency for Research on Cancer, the National Toxicology Program, the Food and Drug Administration (FDA) and the National Institute of Occupational Safety and Health (NIOSH). *Id.*

[264] U.S. CONST. art. I, § 8, cl. 3.

will and momentum that can be brought to bear by the citizenry and each branch of government. Two factors affect the ban's scope. First, because existing federal statutes are fragmented by source, no single existing statute's authority covers all sources of hazardous substances. Second, because some existing federal statutes provide regulatory authority only at the federal level, states may not pass more stringent standards than the federal standards.

1. Federal Legislation

The creation of a federal fertilizer statute would focus on full-cycle fertilizer management, from quality of source materials through production and use of the fertilizer, the effect on food quality and safety, and other environmental consequences. This approach would provide several benefits. First, all citizens, whether consumers, farm workers, or fertilizer factory workers, would be protected at the same level from contaminated food and products. Second, a single definition would provide consistency for manufacturers whose products are distributed in multiple states. Third, a federal standard for wholesome fertilizer could provide grounds for preventing international dumping of hazardous material labeled as fertilizer. Finally, an interstate consistency of burden would prevent any state from using contaminated fertilizer while shipping its contaminated food, air, or water out of state.

a. A Federal Fertilizer Statute Would Have to be Built from Scratch

Despite the above-mentioned benefits, a federal ban is not the recommended solution because passage of a federal law would take so long that it is not reasonably foreseeable. Because fertilizer regulation has traditionally been a state function, there is no existing federal fertilizer statute.[265] In order to ban hazardous substances in fertilizer, a federal fertilizer statute would need to be crafted from scratch.

Pesticide control serves as a precedent for evaluating the time, effort, and political will necessary to pass a federal hazard control statute. The risks from contaminated fertilizer are similar to

[265] BNA Daily Environmental Report, *Lead Report: Hazardous Wastes,* No. 159 AA-2 (Aug. 19, 1997).

the risks posed by pesticides prior to the passage of the Federal Environmental Pesticide Control Act of 1972. That statute was enacted only as the result of strong public pressure stemming from awareness of the hazards of chemicals such as DDT.[266]

Here, public pressure on the elected branches for fertilizer control has not yet reached the level necessary to spur congressional action. This is so even though growing public awareness and opposition to hazardous substances in fertilizer[267] has spurred a few state legislatures to recognize that hazardous fertilizer constitutes a public emergency.[268] Given the congressional focus on legislation supporting the 'war on terrorism' and Iraq, coupled with President Bush's past and present position on issues framed as 'environmental protection versus corporate profit,'[269] contaminated fertilizer is not likely to receive meaningful national attention for several years.[270]

In the absence of a fertilizer statute, another method of enacting a federal ban is by amending an existing statute such as: (1) the Solid Waste Disposal Act of 1970, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA),[271] controlling the disposal and recycling of hazardous wastes; (2) the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), controlling the manufacture, distribution, and use of pesticides;[272] and (3) the Toxic Substances Control Act (TSCA),[273] controlling the manufacture, distribution, use, and disposal of chemical substances and mixtures. However, as will be discussed below, none of these statutes, even if amended to cover fertiliz-

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[266] STOLEN FUTURE, *supra* note 10, at 201-02.

[267] *E.g.*, WILSON, *supra* note 2.

[268] *E.g.*, WASH. REV. CODE § 15.54.440(1) (2002).

[269] For example, some of President Bush's actions during his first year in office: "[L]ift[ed] air-pollution standards for California power plants"; "plan[ned] to cut Interior Department funding for environmental policy enforcement by 7 percent"; "withdr[ew] from the Kyoto Protocol on global warming"; "cancel[ed] the implementation of the arsenic rule, citing a national controversy"; "[t]he administration announce[d] it would open 1.5 million acres of the Gulf of Mexico to oil drilling". Mathew Gross, *Beating Around the Bush: A look at the president's first year in office*, GRIST MAGAZINE (Feb. 12, 2002) at http://www.gristmagazine.com/grist/ imho/ gross021202.asp.

[270] "Most legislatures are far too busy with more generic issues such as budget and taxes. They are often reluctant to involve themselves in the detail of government." Matthew Fox, *Understanding Admin. Law*, pp. 7-8, n.8 (3d ed. 1997).

[271] 42 U.S.C. §§ 6901-6992k (2000).

[272] 7 U.S.C. §§ 136-136y (2001).

[273] 15 U.S.C. §§ 2601-92 (2001).

ers, have the scope to provide the full benefits of the recommended state law.

b. *RCRA's Labyrinth of Hazardous Waste, Solid Waste, and Recycling Regulations*

In the absence of a federal fertilizer statute, the use of hazardous and solid waste in fertilizer is currently controlled under the Resource Conservation and Recovery Act of 1976 (RCRA).[274] There are two reasons that RCRA is not the best method to achieve this Article's proposed ban on hazardous substances in fertilizer. First, the EPA's implementing regulations have made "recycling" of hazardous waste a priority over protecting health and the environment.[275] Second, the EPA's authority extends only to hazardous waste,[276] not to hazardous "virgin" materials.

Congress' intent is clear within RCRA's statement of national policy, congressional findings, and objectives, that hazardous waste is to be properly managed initially to reduce the need for corrective action later.[277] Congress also recognized the close nexus between commercial activity and potentially harmful solid waste by enacting RCRA under the Commerce Clause.[278]

RCRA's objectives include

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[274] Amendments to the Solid Waste Disposal Act, Pub. L. No. 94-580, 90 Stat. 2795 (1976).

[275] BNA Daily Environmental Report, *supra* note 265 (quoting Elizabeth Cotsworth, EPA Office of Solid Waste, "[I]n the case of K061, its most useful ingredients—zinc and iron—are more valuable on the land than other constituents are harmful. . . .").

[276] *See* 42 U.S.C. § 6903(5) (2000).

[277] 42 U.S.C. § 6901(b)(6) (2000); 42 U.S.C. §§ 6902(a)(5) and (c)(5) (2000).

[278] United States v. Rogers, 685 F. Supp. 201, 202-03 (D.C. Minn. 1987). Also, Congressional findings indicate "increased industrial production to meet our needs, . . . with related industrial, commercial, and agricultural operations, have resulted in a rising tide of scrap, discarded, and waste materials. . . ." 42 U.S.C. § 6901(a)(2) (2000).

> The Congress finds with respect to the environment . . . that
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> . . . (2) disposal of solid waste and hazardous waste in or on the land without careful planning and management can present a danger to human health and the environment; . . . (4) open dumping is particularly harmful to health, contaminates drinking water from underground and surface supplies, and pollutes the air and the land; . . . (7) . . . to avoid substantial risk to human health and the environment, reliance on land disposal should be minimized or eliminated, and land disposal, particularly landfill and surface impoundment, should be the least favored method for managing hazardous wastes; . . . .
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> 42 U.S.C. § 6901(b) (2000).

> promot[ing] the protection of health and the environment by— . . . assuring that hazardous waste management practices are conducted in a manner which protects human health and the environment; [and] requiring that hazardous waste be properly managed in the first instance thereby reducing the need for corrective action at a future date.[279]

Proper management is to be assisted through a national research program to promote treatment, reduction, recycling, and reuse of waste materials.[280]

Congress also set a national policy that wherever feasible "the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible. Waste that is nevertheless generated should be treated, stored, or disposed of so as to minimize the present and future threat to human health and the environment."[281] This national policy does not mention recycling or reuse, nor does the policy give such practices priority over protecting human health and the environment.

The priority for waste management is to protect health from improper waste disposal by "minimizing the generation of hazardous waste and the land disposal of hazardous waste by encouraging process substitution, materials recovery, properly conducted recycling and reuse, and treatment."[282] These objectives are to be achieved by improving the quality of waste disposal sites, and by promoting research and development of methods of reducing, recycling, or reusing waste materials.

Although Congress's intent is clear, the EPA's quagmire of "recycling" definitions and exemptions has, even in the face of extreme uncertainty, promoted recycling over treatment. These regulations, along with some highly criticized judicial legisla-

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[279] 42 U.S.C. § 6902(a) (2000).
[280] *Id.* § 6902(a)(9)-(10).
[281] *Id.* § 6902(b).
[282] *Id.* § 6902(a)(6).

tion,[283] have resulted in the widespread harm that Congress intended to avoid.[284]

RCRA amendments to the Solid Waste Disposal Act are managed under the EPA's Office of Solid Waste, which is granted authority to manage waste.[285] The EPA Administrator's authority, under RCRA, does not extend to hazardous substances from sources other than waste.[286] Therefore, this Article's proposed ban of hazardous substances in fertilizer, unconstrained by the source of the hazardous substance, is beyond the Administrator's authority to fully effectuate.

c. Amend FIFRA to Include Fertilizer

FIFRA is an existing federal statute controlling the production and use of pesticides. Although FIFRA covers plant-growth regulators, it exempts fertilizers.[287] Amending FIFRA to remove the fertilizer exemption is another method to implement this Article's ban at the federal level. An advantage of this option is that FIFRA's licensing scheme embodies the Precautionary Principle, in that a product is not licensed for manufacture, distribution, or use within the United States until the manufacturer proves the product's safety.[288]

Even if Congress took up the task of amending FIFRA, which is highly unlikely, this is not an effective option because it would almost certainly be immediately challenged. As currently structured, FIFRA allocates sole authority to the EPA for labeling regulations, and authority to the states to regulate sale and

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[283] RODGERS TREATISE, *supra* note 121, at 44 (calling the decision in Am. Mining Cong. V. U.S. EPA, 824 F.2d 1177 (D.C. Cir. 1987), "one of the more regressive of environmental opinions in recent times . . . ."). Professor Rodgers continues:

> The court was unmoved by unusually clear Congressional signals on the subject, and impervious to the environmental damage it had sanctioned. In the short run, the decision is the definition of "solid wastes" to the hidden intentions of the depositor . . . . The mid-range effect . . . is to place a halo of legal doubt around any attempts by EPA to use RCRA to regulate materials that linger on the scene in anticipation of some remote if implausible future use. In the longer run, Congress will be drawn into redefining the boundary between inventory and waste . . . .

Id. at 44-45.

[284] *Id*. at 44.

[285] 42 U.S.C. § 6911(a) (2000).

[286] *See* Am. Mining Cong. v. United States EPA, 824 F.2d 1177, 1193 (D.C. Cir. 1987).

[287] 7 U.S.C. § 136v (2001).

[288] *Id.* at § 136a.

use.[289] If Congress amended FIFRA to include fertilizers, it would move the federal government into a field currently and historically occupied solely by the states. This would expressly preempt existing fertilizer labeling statutes in forty-eight states, and by implication preempt state fertilizer regulations under the preemption doctrine of the Supremacy Clause.

d. Amend TSCA to Include Fertilizer

TSCA is an existing federal statute controlling toxic substances. Amending TSCA to include fertilizers is another option to implement this Article's proposed ban at the federal level. An advantage of TSCA is that the EPA's authority could reach all hazardous substances, regardless of the hazardous substance's source or type of fertilizer it is used in.

However, two aspects of TSCA prevent it from being a viable option for banning hazardous substances in fertilizer.

First, TSCA is a federal-only statute. There is no provision for delegating authority to the states to set more stringent regulations. Therefore, even if Congress took up the task of amending TSCA, which is highly unlikely, this amendment would be open to the same states' rights challenges as FIFRA.

Second, TSCA, like RCRA, places the burden of proof on the government rather than industry. TSCA, unlike FIFRA, may not stop a product from going to market, unless the EPA has sufficient data to challenge the product's safety within a mere ninety days from notification of intent to manufacture.[290] The presumption is that a product is safe for distribution until the government agency proves the product is not safe. Therefore, given the uncertainty of proving injury and causation, TSCA would not force cost internalization for hazardous substances in fertilizer.

2. Federal Regulation—the EPA Approach

A brief overview of the EPA approach to regulating hazardous waste in general, and substances recycled into fertilizer in particular, will highlight why reliance on federal regulation to solve the problem in a timely manner is not a viable option.

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[289] *Id.* at § 136v(a)-(b).

[290] *Id.* at § 136c(a)(1).

In RCRA Subpart C, Congress established a dual federal and state program regulating the cradle-to-grave management of hazardous waste as a category of solid waste.[291] The federal government is responsible for promulgating national standards, performing research, and developing performance designs. States may, upon approval by the EPA, adopt the RCRA standards and directly manage and enforce the regulations at the state level.[292]

The RCRA amendments grew out of a concern that waste material was being disposed by dumping it onto the land which caused hazardous substances to leach into groundwater.[293] Therefore, EPA regulations implementing subpart C contain an extensive set of regulations for land disposal, known as the Land Disposal Restrictions (LDR).[294] The LDRs presume that hazardous substances are disposed of in a waste disposal facility. The LDRs further presume that the risk to be avoided is hazardous substances leaching into the groundwater at the waste disposal facility.[295] Therefore, the EPA's treatment[296] standards set under RCRA's LDRs are based on leaching models, not soil persistence, plant uptake, or food residue models, which would be more appropriate measures of harm from hazardous substances used in fertilizer.[297]

Further, RCRA encourages efficient recycling of hazardous waste to minimize land disposal. Depending on the conditions under which the hazardous waste is "recycled," the resulting

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[291] Theodore L. Garrett, *An Overview of RCRA*, *in* AMERICAN BAR ASSOCIATION, THE RCRA PRACTICE MANUAL 1 (Theodore L. Garrett ed., 1994).

[292] 42 U.S.C. § 6926(b) (2000).

[293] EPA's regulations implementing RCRA's subpart C, or hazardous wastes control requirements, may be found at 40 C.F.R. § 260.1 (2001).

[294] U.S. EPA, RCRA ORIENTATION MANUAL, SECTION III, RCRA SUBTITLE C, MANAGING HAZARDOUS WASTE, CHAPTER 6; LAND DISPOSAL RESTRICTIONS III-89, *available at* http://www.epa.gov/epaoswer/general/orientat/rom36.pdf (last visited Mar. 10, 2003) [hereinafter LDRs CHAP. 6].

[295] *See* Ass'n of Battery Recyclers, Inc. v. U.S. EPA, 208 F.3d 1047, 1061-62 (D.C. Cir. 2000).

[296] The term 'treatment', when used in connection with hazardous waste, means:

> any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste or so as to render such waste nonhazardous, . . . amenable for recovery . . . . Such term includes any activity or processing designed to change the physical form or chemical composition of hazardous waste so as to render it nonhazardous.

42 U.S.C. § 6903(34) (2000).

[297] EPA PROPOSED ZINC FERTILIZER RULE, *supra* note 137, at 70,968.

"product" may be regulated as a solid waste under a set of regulations known as Use Constituting Disposal (UCD),[298] or may be exempt from the waste regulations altogether.[299] For example, if a fertilizer manufacturer uses an RCRA-listed hazardous substance, the substance need only be treated, under the UCD, to the level of "safety" required for disposal in a landfill. If the fertilizer manufacturer uses a hazardous substance that is exempt from RCRA, the substance does not need to be treated because it is exempt from treatment standards.[300]

These presumptions and exemptions have had multiple unintended consequences. First, they limit the EPA's regulatory authority at the line between waste and where the waste becomes a product or is claimed as inventory.[301] Second, hazardous substances recycled into fertilizer have been classified as inventory and/or product, rather than waste, thereby allowing waste generators and fertilizer manufacturers to circumvent regulation.[302] Third, the applicable standards have been set based on a "leaching" test known as TCLP, rather than testing methods more appropriate to contaminated fertilizer's other transport methods. Finally, the risk assessment used as the basis of balancing the regulation's cost and benefit used groundwater and surface water as the primary exposure pathways.[303]

The waste recycling rules also explain that activities constituting valid recycling include the use, reuse, or reclamation of materials from hazardous waste.[304] A material is recycled when the waste is used as an ingredient in a product and/or as an effective substitute for a commercial product.[305] Although some hazardous waste recycled into fertilizer may still be regulated because the "product" is disposed of on the land,[306] the majority of hazardous waste is exempted from regulation when used as an

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[298] *Id.* at 70,956; also 40 C.F.R. § 261.2(c) (2003).

[299] *See* EPA PROPOSED ZINC FERTILIZER RULE, *supra* note 137, at 48,935.

[300] WILSON, *supra* note 2, at 284, quoting 40 C.F.R. 266.20(b) (amended 2003).

[301] Am. Mining Cong. v. U.S. EPA, 824 F.2d 1177, 1192 (D.C. Cir. 1987).

[302] *See* EPA FINAL ZINC FERTILIZER RULE, *supra* note 26, at 48,397.

[303] THE WEINBERG GROUP, HEALTH RISK EVALUATION OF SELECT METALS IN INORGANIC FERTILIZERS POST APPLICATION 9 (2000) *at* http://www.aapfco.org/RBCWhite.pdf.

[304] Protection of Environment, 40 C.F.R. § 261.6 (2003).

[305] DEBORAH HITCHCOCK JESSUP, WASTE MANAGEMENT GUIDE: LAWS, ISSUES & SOLUTIONS, 158 (The Bureau of National Affairs 1992).

[306] *Id.* at 159; *see* 40 C.F.R. § 261.3.

ingredient, or when used directly as an effective substitute for a commercial product.[307]

EPA regulations distinguish between regulated and non-regulated recycled waste fertilizer based on the hazardous waste undergoing a chemical reaction during the fertilizer production process, thereby making it inseparable from other substances.[308] Because this chemical reaction is the distinguishing activity, hazardous wastes are regulated prior to this activity, but the finished fertilizer product is exempt.[309] In the Zinc Fertilizer Rule the EPA "decided to propose specific levels . . . at which waste-derived *zinc* fertilizers should be considered products, rather than waste."[310] In the context of waste-derived fertilizers, hazardous waste is a "product" when the quantity of hazardous material is below the EPA-set standard.

However, these regulations exempt some highly toxic substances from hazardous waste disposal regulation,[311] based on the belief that metals will be diluted in the soil and will not be taken up by plants.[312] Since RCRA also made recycling a priority, and the harm from plant uptake was unknown at that time, the EPA promulgated rules that recycling hazardous waste into fertilizer is an acceptable practice as long as two requirements are met. First, the waste is treated to a nonhazardous level, as defined by a technology standard,[313] and second, the use is an effective substitute for an existing product[314].

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[307] HITCHCOCK JESSUP, *supra* note 305, at 161.

[308] *Id.*

[309] *Id.*

[310] EPA PROPOSED ZINC FERTILIZER RULE, *supra* note 137, at 70,956 [emphasis added].

[311] 40 C.F.R. § 261.4 (2003) excludes certain materials from the solid waste classification and certain solid wastes from the hazardous waste classification.

. . . (b) The following solid wastes are not hazardous wastes:

. . . (4) Fly ash waste, bottom ash waste, slag waste, and flue gas emission control waste, generated primarily from the combustion of coal or other fossil fuels . . . .

. . . (7) Solid waste from the extraction, beneficiation, and processing of ores and minerals (including coal, phosphate rock and overburden from the mining of uranium ore) . . . (ii)(A) Slag from primary copper processing; (B) Slag from primary lead processing; . . . (L) Air pollution control dust/sludge from iron blast furnaces; . . . (S) Chloride process waste solids from titanium tetrachloride production; (T) Slag from primary zinc processing.

(8) Cement kiln dust waste, except . . . for facilities that burn or process hazardous waste. 40 C.F.R. § 261.4.

[312] WILSON, *supra* note 2, at 155.

[313] LDRs CHAP. 6, *supra* note 294, at III-103.

[314] 40 C.F.R. § 261.33(c) (2003).

a. EPA Standard-Setting Under RCRA

The EPA's charge to set treatment standards for hazardous wastes for land disposal was a daunting challenge. The 1984 HSWA amendments divided the task into three parts, each with a deadline set by Congress. Establishing standards for wastes exhibiting toxic metals was in the third phase, and the EPA promulgated a final rule known as the "Third-Third Land Disposal Rule"[315] in 1990. The objective of the standards established by the Third-Third LDR was to treat toxic metals to a nonhazardous level when the substances were disposed in a landfill. Therefore, when substances used in fertilizer were treated to the regulated level, it meant that the fertilizer would not be hazardous if disposed in a landfill.[316] Treatment to the hazardous waste characteristic level did not guarantee a safety level when the metals were recycled into a "product" rather then sent to a landfill.[317]

In this instance, treatment standards for fertilizer are analogous to asphalt, which is another use for recycled hazardous substances. In *Ass'n of Battery Recyclers v. EPA*,[318] the D.C. Circuit held that EPA regulations requiring greater treatment for waste recycled into products applied to land were not arbitrary or capricious. Such "disposal" poses greater risks, and thus requires greater treatment, than waste disposed of in landfills.[319] The EPA promulgated the "Phase IV Land Disposal Rule, Part II" in response to the decision in *Ass'n of Battery Recyclers*. This rule revised RCRA's standard for metal waste toxicity[320] to below hazardous waste characteristic levels. However, the Phase IV, Part II LDR standards, as applied to *zinc* micronutrient fertilizers, were stayed pending judicial review.[321] This stay allowed an administrative amendment, via "Phase IV Land Disposal Rule, Part IV,"[322] to exempt zinc micronutrient fertilizers from the

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315 *See* Land Disposal Restrictions for Third Scheduled Wastes, 55 Fed. Reg. 22,520, 22,688 (Jun. 1, 1990).

316 *See* 42 U.S.C. § 6903(34) (2000).

317 *See* Hazardous Waste Recycling, 63 Fed. Reg. 46,332 (Aug. 31, 1998) (to be codified at 40 C.F.R. pt. 268) [hereinafter PART IV].

318 208 F.3d 1047 (D.C. Cir. 2000).

319 *Id.* at 1059-60.

320 *See* 40 C.F.R. § 268.40 (2003).

321 PART IV, *supra* note 317, at 46,333.

322 "EPA is today amending § 268.40 by adding a new paragraph (I), which will in effect stay the Phase IV rule insofar as it applies treatment standards for hazardous constituent metals in zinc-containing fertilizers that are produced from hazardous wastes which exhibit the toxicity characteristic." *Id.*

Phase IV standards. For zinc micronutrient fertilizers, the Third-Third LDR rule applied until the Final Zinc Fertilizer Rule was promulgated in July, 2002. The EPA's stay request provided four "good cause" reasons.[323] Close analysis of the four reasons sheds light on the weakness of the EPA's fragmented regulatory approach.

The EPA's first reason was that "such treatment would likely also immobilize the zinc component of the fertilizer, which would render it unsuitable for plant food."[324] In other words, to treat the hazardous waste to the lower standard would eliminate any pretense that the product was "fertilizer." When a recycled hazardous waste is no longer a fertilizer, the hazardous waste recycling exemption no longer applies, and it becomes subject to the hazardous waste disposal regulations.[325] When a recycled material is no longer an effective substitute for a non-recycled material, the solid waste exemption no longer applies, and the substance is subject to the solid waste disposal regulations.[326]

The EPA's second reason was that treatment costs for regulated source materials could have "the effect of eliminating from the market certain fertilizer products that contain relatively low levels of hazardous constituents (e.g., lead and cadmium), while other fertilizer products that contain higher levels of contaminants, including some produced from hazardous wastes, would be unaffected."[327] In essence, this reason asked the court to stay tighter standards on any hazardous substances because the EPA's fragmented regulations could not apply to all hazardous substances originating from waste or virgin material. This reason also ignores statutory authority, under RCRA, for the Secretary of Commerce to impose the same monitoring and controls on virgin materials as on reclaimed materials, so that the reclaimed materials are not prejudiced in the market in the manner that the EPA claims.[328]

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[323] *Id.*

[324] *Id.*

[325] *See* 40 C.F.R. § 261.4(b) (2002).

[326] *See id.* at § 261.2(e)(1).

[327] PART IV, *supra* note 317, at 46,333.

[328] 42 U.S.C. § 6955 (2002) provides in part: "In establishing any policies which may affect the development of new markets for recovered materials . . . , the Secretary of Commerce may consider whether to establish the same or similar policies or impose the same or similar monitoring or other controls on virgin materials."

The third reason the EPA requested the stay was that the Phase IV, Part II standards "could encourage the use of zinc fertilizers made from K061, which is exempt from regulation (and thus does not have to meet RCRA treatment standards) when used to manufacture fertilizer."[329] It is unfathomable how this is a "good cause" reason to stay stricter standards on hazardous wastes in all fertilizers merely because the stricter standards did not close the infamous K061 exemption.

In the face of uncertainty, the cautious action would have been to promulgate the Phase IV, Part II standards and then proceed with separate rulemaking to remove the K061 exemption and to address the other anomalies noted in "good cause" reason number two.

Finally, the EPA "recognize[d] that the Phase IV rulemaking has highlighted the anomalous and inconsistent nature of the current RCRA regulations that apply to use of hazardous wastes in fertilizer manufacture. Consequently, the Agency [planned] to develop a more consistent and comprehensive set of regulations for controlling such practices."[330] While the existing regulations are inconsistent, this statement is not clear as to when the EPA intended to proceed with promulgating the more consistent fertilizer standards. The timing of the proposed Zinc Fertilizer rule, promulgated two years after the Phase IV, Part II standards were stayed, was required by a settlement of the petition for review of the Phase IV administrative stay filed by the Washington Toxics Coalition, the Sierra Club, and the Environmental Technology Council.[331] The Final Zinc Fertilizer Rule was promulgated almost two years after the proposed rule, and four years after the

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[329] PART IV, *supra* note 317, at 46,333. "Fertilizers made from electric arc furnace dust (also known by its RCRA waste code as K061) are specifically exempted from having to meet the LDR standards. EPA believes that the original basis for exempting K061-derived fertilizers from these standards is no longer valid." EPA PROPOSED ZINC FERTILIZER RULE, *supra* note 137, at 70,955.

Although not apparent in 1988 when EPA promulgated this exemption, further study makes clear that these fertilizers typically contain higher concentrations of hazardous constituents (e.g., lead and cadmium [and hexavalent chromium]) than zinc-containing fertilizers produced from characteristic hazardous wastes. (Letter from Chris Leason, August 17, 1998.) Thus, the Phase IV rule, by foreclosing the use of these less contaminated waste-derived fertilizers, could actually result in greater use of K061-derived fertilizers, which generally contain higher levels of contaminants."
Id.

[330] *Id.*

[331] EPA PROPOSED ZINC FERTILIZER RULE, *supra* note 137, at 70,957.

stay.[332] Without these externally imposed deadlines it is unlikely that a final rule would have been promulgated in only four years.

1. The EPA Approach is Fragmented

As described above, and as acknowledged by the EPA,[333] the EPA's regulatory approach to hazardous substances recycled into fertilizer under RCRA is severely fragmented. Determining which standard, if any, applies is based on whether the substance is subject to a hazardous waste rule, a solid waste rule, a land disposal rule (LDR), or is exempt.

The Final Zinc Fertilizer Rule removed the exemption for K061,[334] and set limits for dioxin.[335] However, this rule applies to only zinc fertilizers, and will not remove the exemption for use in other types of fertilizer, such as phosphorous fertilizers. Therefore, this fragmented approach does not stop hazardous waste being used in fertilizer. Instead, it merely shifts the use to an unregulated type of fertilizer.

2. Technology-based Standards are not Intended to Protect Health

The Congressional goals, objectives, and policy clearly stated in RCRA's text rank maintenance of human health and the environment as the statute's primary concerns. Under RCRA,

> "hazardous waste" means a solid waste, or a combination of solid wastes, which, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may—(A) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.[336]

The EPA uses a technology-based standard, Best Demonstrated Available Technology (BDAT), which is the "technology that best minimizes the mobility or toxicity (or both) of the haz-

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[332] EPA FINAL ZINC FERTILIZER RULE, *supra* note 26, at 48,393.

[333] PART IV, *supra* note 317.

[334] EPA FINAL ZINC FERTILIZER RULE, *supra* note 26, at 48,395.

[335] *Id.* at 48,406.

[336] 42 U.S.C. § 6903(5) (2000).

ardous constituents for a particular waste."[337] "The RCRA standards that now apply to most hazardous waste derived fertilizers . . . were developed based on 'best demonstrated available technology' for treating hazardous wastes prior to *disposal in hazardous waste landfills*. Therefore, the LDR standards were not developed specifically for fertilizers,"[338] which are "disposed" of by spreading on land rather than in a hazardous waste landfill. "A number of stakeholders have argued persuasively for contaminant standards that are more appropriate and specific to fertilizers."[339]

As mentioned previously, the Final Zinc Fertilizer Rule sets standards for a few hazardous substances that are recycled into zinc fertilizers. However, the rule has several deficiencies. First, the rule establishes technology-based standards for only five metals.[340] The rule does not attempt to set limits for several heavy metals, such as selenium and cobalt, found in waste-derived fertilizers.[341] Second, the proposed rule establishes a limit for dioxin that is higher than the current average rural background level.[342] This standard would allow the level of dioxin to *increase* above the background level, through application of fertilizer containing dioxin. Third, the proposed rule would establish standards for only three PBTs: cadmium, mercury, and lead. Finally, the final rule did not set the standards at the lowest level achievable by the best demonstrated available technology (BDAT), but instead the standards are set at levels that do not require technology upgrades by a few fertilizer producers.[343]

In the preamble to the proposed rule, the EPA noted that the agency investigated whether a broad new regulatory scheme, such as TSCA (Toxic Substances Control Act), was necessary. A new regulatory scheme was rejected because, based on the findings published in three risk assessments, the EPA determined

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337 U.S. ENVIRONMENTAL PROTECTION AGENCY, LAND DISPOSAL RESTRICTIONS NOTIFICATION REQUIREMENTS, APPENDIX B, D-2, *available at* http://www.epa.gov/epaoswer/general/orientat/romapb.pdf (last visited Apr. 17, 2003).

338 *See* Ass'n of Battery Recyclers v. EPA, 208 F.3d 1047 (D.C. Cir. 2000) (acknowledging special risks posed by uses constituting disposal justifying stricter LDR standards).

339 EPA PROPOSED ZINC FERTILIZER RULE, *supra* note 137, at 70,955.

340 Arsenic, cadmium, chromium, lead, and mercury. EPA FINAL ZINC FERTILIZER RULE, *supra* note 26, at 48,403.

341 *Id.* at 48,404.

342 EPA PROPOSED ZINC FERTILIZER RULE, *supra* note 137, at 70,972.

343 EPA FINAL ZINC FERTILIZER RULE, *supra* note 26, at 48,405.

that the relatively small risk from contaminated fertilizer did not warrant the regulatory effort.[344] However, of the three risk assessments that the EPA relied on, only two are exposure risk assessments, which are subject to the deficiencies inherent in all exposure risk assessments, as noted previously.[345] The third risk assessment was not an exposure risk assessment (estimating the level of exposure that will cause harm to humans);[346] it was an assessment of whether Washington State's background level-based standards would limit the contaminant levels, at current application rates, to doubling within forty-five years.[347] Thus, the EPA's finding that a new regulatory scheme is unnecessary for hazardous waste in fertilizer, based on questionable and inapplicable studies, is also questionable. Although a challenge to the rule will go before the D.C. Circuit Court in the fall of 2003,[348] the issue has been foreclosed for the foreseeable future.

b. The Rulemaking Process is Too Long

Each standard level-setting rulemaking process requires the EPA to gather data and perform extensive analysis to justify the standard. This process often takes several years. Washington State recognized in 1998 that hazardous substances in fertilizer constituted an emergency situation.[349] Canada implemented

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[344] EPA PROPOSED ZINC FERTILIZER RULE, *supra* note 137, at 70,955.

[345] *See* OFFICE OF SOLID WASTE, U.S. EPA, BACKGROUND DOCUMENT ON FERTILIZER USE, CONTAMINANTS AND REGULATION (1999), *available at* http://www.epa.gov/opptintr/fertilizer.pdf (last visited Mar. 12, 2003); OFFICE OF SOLID WASTE, U.S. EPA, ESTIMATING RISK FROM CONTAMINANTS CONTAINED IN AGRICULTURAL FERTILZERS: DRAFT REPORT (1999), *available at* http://www.epa.gov/epaoswer/hazwaste/recycle/fertiliz/risk/report.pdf (last visited Mar. 12, 2003); FOSTER-WHEELER ENVTL. CORP., DEVELOPMENT OF RISK BASED CONCENTRATIONS FOR ARSENIC, CADMIUM AND LEAD IN INORGANIC COMMERCIAL FERTILIZERS (Mar. 1998), *available at* http://www.tfi.org/publications/images/kj212_.pdf (last visited Mar. 12, 2003).

[346] MDH FERTILIZER EVALUATION, *supra* note 78, at 3.

[347] SCREENING SURVEY, *supra* note 114.

[348] Safe Food and Fertilizer, California Public Interest Research Group, and Oregon Toxic Alliance v. U.S. EPA petition to the D.C. Circuit, Oct. 21, 2002.

[349] Commercial fertilizers that are not registered in Washington state or that fail to meet the Washington standards for total *metals pose an emergency situation* because they may contain certain metals at levels which are harmful to Washington soils and plants and may contain substances which are harmful to the public without its knowledge. Commercial fertilizers that are not registered or that fail to meet the Washington standards for total metals are subject to immediate stop sale, stop use, or withdrawal from distribution in this state and seizure, disposal, or both.

standards in 1996.[350] To promulgate rules covering each of the EPA's fragments, such as phosphorous fertilizers, iron fertilizers, and dioxins in each form of fertilizer, could take decades.

Therefore, the most efficient and effective alternative is one that avoids the EPA's rulemaking process.

B. The Recommended State Statutory Control

As a traditional state function, forty-eight states have some form of fertilizer control statute. While the purpose of traditional fertilizer statutes has been to ensure that fertilizer buyers receive the promised amount of nutritive material, these statutes may be amended to ban hazardous substances. The first section demonstrates that the states currently have the authority to enact the recommended ban on hazardous substances in fertilizer. The second section analyzes the necessity of enacting the ban by statute, not regulation. The third section discusses the "critical factors" a state legislature should consider when drafting a statute to ban hazardous substances in fertilizer.

1. States Have the Authority

While the following sections are not intended to be an exhaustive analysis of the states' authority under federalism, two possible constraints, RCRA and the Commerce Clause of the United States Constitution, will be shown to not bar state action.

a. State Authority Under RCRA

Any state that is authorized to manage RCRA within the state is explicitly authorized to adopt controls that are more stringent, but not less stringent, than the federal standards.[351] RCRA allows a state to "issue and enforce permits for the storage, treatment, or disposal of hazardous waste" and to otherwise manage the program in lieu of the federal government.[352] Therefore, the

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WASH. REV. CODE § 15.54.440(1) (2002) [emphasis added]. "This act [the Fertilizer Regulation Act of 1998] is necessary for the immediate preservation of the public peace, health, or safety, or support of the state government and its existing public institutions, and takes effect July 1, 1999." WASH. REV. CODE § 15.54.325 (1999). *See also* 2002 ALS 670 (amending Maine's fertilizer statutes to limit arsenic content under emergency conditions).

[350] WILSON, *supra* note 2, at 285-86 n.7 (citing Trade Memorandum T-4-03 (Aug. 1996).

[351] 42 U.S.C. § 6929 (2000).

[352] 42 U.S.C. § 6926(b) (2000).

state may ban the "disposal" of hazardous waste in fertilizer because this is a more stringent standard than any currently required by the EPA under RCRA's land disposal rules. Alternatively, this same authority would allow the states to require "treatment" to a zero-tolerance level before a hazardous waste could be used in fertilizer.

b. State Authority Under the Dormant Commerce Clause Doctrine

"State regulation affecting interstate commerce will be upheld if (a) the regulation is rationally related to a legitimate state end, and (b) the regulatory burden imposed on interstate commerce, and any discrimination against it, are outweighed by the state interest in enforcing the regulation."[353] Four factors favor the states' authority, under the Dormant Commerce Clause doctrine, to ban hazardous substances from fertilizer. First, preventing hazardous substances from entering the food supply and the environment through fertilizers is clearly within the states' traditional police powers and is a legitimate state end. Second, the effect on interstate commerce should be minimal, since only fertilizers containing hazardous substances will be banned. Thus, the regulation's benefit should outweigh any incidental effect on interstate commerce, as weighed under the *Pike* balancing test.[354]

Third, protecting national and local food supplies through local regulation promotes the national normative values inherent in the Commerce Clause, which prevent imposition of state policies on those who lack political representation within the state.[355] The Commerce Clause "was not meant to usurp the police power of the states which was reserved under the Tenth Amendment."[356] Thus, courts will usually uphold state laws that are motivated primarily by environmental, rather than economic, protectionism.[357] Even so, economic hardship in itself is not sufficient to invalidate a state regulation affecting interstate com-

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[353] LAWRENCE TRIBE, AMERICAN CONSTITUTIONAL LAW 408 (2d ed. 1988) [hereinafter TRIBE].

[354] Pike v. Bruce Church, 397 U.S. 137 (1970).

[355] Whitaker v. Spiegel, Inc., 623 P.2d 1147, 1155 (1981) (citing LAWRENCE TRIBE, AMERICAN CONSTITUTIONAL LAW 327 (1978)).

[356] *Id.* (quoting American Can Co. v. OR Liquor Control Comm'n, 517 P.2d 691, 696 (1973)).

[357] TRIBE, *supra* note 353, at 415.

merce.[358] The United States Supreme Court held in *Exxon Corp. v. Governor of Maryland* that the Commerce Clause "protects the interstate market, not particular interstate firms, from prohibitive or burdensome regulations."[359] The court has upheld regulations that significantly burden interstate commerce when the out-of-state interests have been adequately represented in the regulating state's political process by in-state proxies.[360] The Washington Supreme Court favorably cited Professor Tribe's Constitutional Law treatise, stating that the important doctrinal theme in Commerce Clause analysis is protection of the 'political' union, not an economic theory of free trade.[361]

The current practice of allowing hazardous substances in fertilizer favors the narrow economic interests of hazardous substance generators and fertilizer manufacturers. This promotes economic parochialism and discriminates against unrepresented out-of-state persons who are unable to affect those regulations but bear the burden from contaminated fertilizer and food. State legislation that promotes out-of-state persons' interests along with in-state persons' interests, in the absence of federal legislation, is likely to survive judicial review under the Dormant Commerce Clause doctrine.[362]

Finally, there are no preemption issues because Congress has not "entered the field" with legislation addressing fertilizer.

c. *Authority Within the State's Traditional Police Powers*

All states, except Hawaii and Alaska, have a form of Fertilizer Control Act.[363] However, these statutes vary greatly in the amount of control the state exercises over fertilizer content and information required from the manufacturer. For most states, the existing Fertilizer Control Act's authority includes the authority to expand the fertilizer statute to include a ban of hazardous substances. Additional or alternate authority may also be found under the state's public health and welfare statute, or food quality control statute.

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358 *See Whitaker*, 623 P.2d 1147 at 1155.

359 437 U.S. 117, 127-28 (1978).

360 TRIBE, *supra* note 353, at 410.

361 *Whittaker*, 623 P.2d 1147, 1155 (1981) (citing TRIBE, *supra* note 353, at 417).

362 TRIBE, *supra* note 353, at 410.

363 Alaska and Hawaii have individual statutory provisions directing fertilizer regulation, but not as part of a comprehensive Fertilizer Act.

2. *The Legislature is the Appropriate Political Body*

Experience with strict environmental laws demonstrates that the legislative branch's statutory language must be clear that the intent is to set a zero tolerance limit so that the legislature "takes the heat" for any political fallout. When the legislature's intent to ban hazardous substances from use in fertilizer is clearly stated in the statute's text and legislative history, an executive branch agency's regulations implementing that intent will be upheld by the courts.[364] However, experience with other environmental statutes teaches that when the statute gives discretion to the executive agency, the resulting regulation has been less severe than a ban[365], or has not survived judicial review.[366]

Further, it is the legislature's responsibility to protect state industry. There is growing public awareness of hazardous substances in fertilizer.[367] Thus, in addition to protecting health, a ban on contaminated fertilizer will protect agricultural exports from food-quality-related 'scares' or bans[368] that can devastate both the growers' revenues and the state's tax revenues.[369] A ban will also protect recreational resources[370] by removing a source of contamination. A ban of hazardous substances in fertilizer will protect the long term viability of farmland by removing a persistent source of contamination.

3. *Critical Elements for the Proposed State Legislation*

Only five states have passed statutory or regulatory provisions that regulate hazardous substances in fertilizer.[371] For these states, determining the proper balance between the competing

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364 Chevron U.S.A., Inc. v. NRDC, 467 U.S. 837 (1984).

365 PLATER ET AL., *supra* note 17, at 588.

366 An example is EPA's asbestos ban, overturned in Corrosion Proof Fittings v. EPA, 947 F.2d 1201 (5th Cir. 1991).

367 *E.g.*, WILSON, *supra* note 2, at 294-95 n.1.

368 An example is the Alar Apple Scare experienced by Washington apple growers.

369 Estimates of the Alar Scare's financial impact on the apple industry range from $100 million to $375 million (Environmental Working Group, Ten Years Later, Myth of 'Alar Scare' Persists: How Chemical Industry Rewrote History of Banned Pesticide, *at* http://www.ewg.org/pub/home/reports/alar/alar.html (citing Auvil v. CBS 60 Minutes, 800 F. Supp. 928, 930-31 (E.D. Wash. 1992). *See* Jane E. Brody, *Personal Health; Health Scares That Weren't So Scary*, N.Y. TIMES (Aug. 8, 1998).

370 Examples include golf courses, parks, and runoff contaminated swimming and fishing water bodies.

371 *See*, *e.g.*, Wash. Rev. Code § 15.54.270(4) (2003); OR. REV. STAT. § 633.362(11) (2001).

goals of increasing recycling versus protecting health and the environment required an analysis of federal EPA regulations, state authority, potentially conflicting scientific evidence, the economic implications for their constituencies, and the Precautionary Principle doctrine.

Although a few states have taken a broader view of their police powers and enacted laws regarding hazardous substances in fertilizer, many significant issues have not been addressed by any state. The model legislation proposed here is intended to address all of the significant issues. There is also a brief explanation of their importance in a complete statutory control mechanism. If the method of resolving any one issue is not acceptable to the reader, at least this Article serves to raise the issue so it can be satisfactorily addressed in whatever legislative or regulatory provisions may eventually be adopted. The following elements are critical if state legislation is to achieve an effective ban on the use of hazardous substances in fertilizer.

a. The Administrator has the Authority to Regulate Hazardous Substances in Products

The legislature must make clear in the statute that the Administrator has the authority to regulate hazardous substances in fertilizers. This authority lies regardless of whether the hazardous substance originated from a virgin source, a waste source, or a non-waste source, and regardless of whether the process incorporating the substance into fertilizer is defined as "recycling", "reuse", or "disposal" by other relevant regulations.

b. Burden of Proof on Hazardous Waste Generators and Fertilizer Manufacturers

Consistent with the Precautionary Principle, the manufacturer shall have the burden of proving that the product is not hazardous prior to a license being granted. If any part of the fertilizer was derived from a hazardous source material, the manufacturer shall provide proof of treatment or removal of the hazardous substance.[372] As explained above, the burden of proof must be

[372] This is consistent with Pennsylvania's solid waste permitting process for large quantity residual waste generators. These generators must prepare, "at least annually, a detailed physical and chemical analysis of each residual waste stream (including a determination that the waste is not hazardous), or in lieu of annually redoing the analysis, certify that the properties of the waste and the process by which it is

on the manufacturer, as this burden is the primary mechanism to force cost internalization.

c. License

The licensing procedure will be the main method of placing the burden of safety onto the manufacturer. Therefore, a fertilizer product may not be manufactured, distributed, sold, or used in the state without a license. The license application shall require a complete ingredient analysis, including all inert or constituent substances. This requirement to report inert or constituent substances is intended to close the "trade secret" information loophole in toxic control statutes such as FIFRA[373] and TSCA,[374] that serve to deny consumers access to information vital to the properly functioning market. Licenses shall require periodic renewal. Each renewal shall require certification that the formulation and source materials have not changed, or a new analysis shall be required.

d. Referencing Prohibited Substances

Prohibited substances should be referenced to an existing source, such as the EPA's Emergency Planning and Community Right-to-Know (EPCRA) Section 313 list of substances required to be reported for the Toxics Release Inventory,[375] or RCRA's substances exhibiting the toxicity characteristic[376] and listed hazards.[377] Any hazardous substance on the referenced list shall be banned from fertilizer, regardless of whether its source is classified as waste or non-waste. Like California's Proposition 65, referencing existing hazardous substance lists utilizes analysis already performed, reviewed, and approved by competent government agencies.

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generated have not changed." Bruce S. Katcher, *Solid Waste Management in Pennsylvania*, 4 DICK. J. ENVTL. L. & POL'Y 1, 27 (referring to 25 PA. CODE § 287.54).

373 7 U.S.C. §§ 136-136y (2001).

374 15 U.S.C. § 2613 (2001).

375 OFFICE OF ENVIRONMENTAL INFORMATION, U.S. ENVIRONMENTAL PROTECTION AGENCY, NO. 260-B-01-001 EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW SECTION 313: LIST OF TOXIC CHEMICALS (2001), *available at* http://www.epa.gov/tri/chemical/chemlist2001.pdf.

376 40 C.F.R. § 261.24 (2001).

377 40 C.F.R. §§ 261.31-.33 (2001).

e. Prompt Enforcement

The Administrator shall enforce all violations. This provision is necessary to ensure that the law is more than merely symbolic. This also provides the basis for citizen suits to compel enforcement of the Administrator's non-discretionary duties.

f. Public Information Disclosure

Because the purpose of the statute is to protect public health and the environment, the public shall have access to the information that is necessary to validate compliance and to make informed buying decisions. The state shall collect, publish, and make available to the public information from license applications and all enforcement actions taken under the Act.

g. Broad Citizen Suit Provision

Although the state agency shall have primary enforcement responsibility, in recognition of limited agency resources, the public should be leveraged with a broad citizen suit provision. The statute shall authorize citizen suits for violation of any statutory, regulatory, or permit provisions.

The statute shall also authorize action against the Administrator for failure to perform any non-discretionary function.

Remedies may include an injunction or civil penalties. Attorneys fees may be awarded to the substantially prevailing plaintiff. Punitive damages may be awarded at the court's discretion for particularly egregious violations.

h. Limited Discretion for Initial Compliance Date

Past experience with agencies authorized to regulate and enforce environmental laws banning an economic activity without a statutory compliance deadline shows that the agencies have been slow to implement regulations.[378] Therefore, the legislature shall include in the statute a reasonable compliance deadline for the fertilizer industry as a whole within the state. To provide flexibility, the Administrator shall have discretion, within statutory limits, to set compliance deadlines for individual waste producers or fertilizer manufacturers.

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[378] *See generally* the Clean Air Act Amendments of 1990, Pub. L. 101-549, Nov. 15, 1990, 104 Stat. 2399 (setting statutory compliance dates for EPA activities).

i. Consistent Across States to Ease Implementation of EPA Regulatory Changes

Although the EPA urges the states to adopt consistent zinc fertilizer regulations, in order to ease the EPA's promulgation of a future federal hazardous waste/zinc fertilizer rule,[379] this is not a viable request for two reasons. First, the states should not follow the EPA's regulatory scheme for the reasons stated previously. Second, the states that have already adopted regulations are not consistent between themselves. For example, Washington State has already set soil loading-based regulations that set standards for some heavy metals at levels considered unsafe by many stakeholders.[380] In contrast, Oregon set health-based standards. Therefore, even though Washington State was first in time on this issue, its standards should not and have not established the standards for the other states. Further, the EPA encourages states to develop programs to control contaminants in fertilizers.[381]

CONCLUSION

In conclusion, a state statutory ban of hazardous substances in fertilizer will promote the regulatory values of efficiency, equity, and sustainability. Efficiency and equity will be balanced to reflect the societal norms that health and the environment should not be sacrificed for short-term corporate profit. By placing the burden of proof for product safety and efficacy onto the manufacturer, the proposed ban forces hazardous substance generators and the fertilizer industry to internalize costs that are currently externalized to the general public.

At the same time the ban will protect important state agricultural product and recreational revenues. The ban will also provide multiple significant health and environment benefits. First, it will protect against contamination of human and animal food supplies from plant uptake of hazardous substances. Second, it will protect farm workers from exposure during and after fertilizer application. Third, it will protect the environment by preventing the direct application of hazardous substances to the land, which then run off into the water and disperse into the air.

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[379] EPA PROPOSED ZINC FERTILIZER RULE, *supra* note 137, at 70,976.
[380] VISUALIZING ZERO, *supra* note 44, at 30.
[381] EPA FINAL ZINC FERTILIZER RULE, *supra* note 26, at 48,407.

Finally, the proposed ban will promote sustainability. The ban will maintain the viability of farmland that will be needed to feed future generations, and it will protect future generations from the diseases and birth defects that are caused by parental exposure to toxins.

APPENDIX A – MODEL LEGISLATION

§ 1 Short Title

This Act shall be known as the Fertilizer, Soil Amendment, and Liming Material Quality Act.

§ 2 Legislative Findings

(1) The legislature finds that –

(a) human beings and the environment are being exposed each year to a large number of hazardous substances in use in fertilizers, soil amendments, and liming materials;

(b) this exposure is without the public's knowledge or consent;

(c) there is great scientific uncertainty about the environmental transport and plant uptake rates for these hazardous substances, and some may present an unreasonable risk of injury to health and welfare, or the environment;

(d) our current regulations fail to systematically integrate economic and environmental goals, thus putting both at risk; and

(e) fertilizers, soil amendments, or liming materials that fail to meet the state standards for total controlled substances pose an emergency situation because they may contain hazardous substances at levels which are harmful to State beneficial plant life, animals, humans, aquatic life, soil, or water.

(z) Therefore, effective control of fertilizers, soil amendments, and liming materials for sale, distribution, or use within the State necessitates regulation of hazardous substances used in these products.

§ 3 State Policy

(1) Given the credible threat of serious or irreversible damage to health, welfare and the environment, the legislature adopts the precautionary principle to guide the State's fertilizer, soil amendment, and liming material regulation.

(2) The legislature intends to strengthen the State's fertilizer, soil amendment, and liming material adulteration laws to protect human health and the environment by:

(a) ensuring that all fertilizers, soil amendments, and liming materials meet standards for controlled substances;

(b) allowing purchasers and users of these products to know about the product's contents; and

(c) clarifying the Administrator's oversight authority over fertilizers, soil amendments, and liming materials containing a con-

trolled substance, including commercial, custom-blend, bulk, and specialty products and source materials.

(3) The legislature intends to provide better information to the public on fertilizers, soils, and liming materials' potential health effects by funding, conducting, and publishing results from field studies on plant uptake of metals and levels of dioxin in soils and products in conditions representative of State soils.

(4) Adequate data should be developed with respect to the effect of fertilizers, soil amendments, and liming materials on health and the environment specific to soil, wind, and water conditions relevant to this State.

§ 4 Definitions

(1) "Controlled substance(s)" means any substance classified as a hazardous substance prior to its treatment for use in fertilizer.

(2) "Fertilizer" means a substance containing one or more recognized plant nutrients used for its plant nutrient content or that is designated for use or claimed to have value in promoting plant growth, and shall include manipulated animal and vegetable manures. It does not include unmanipulated animal and vegetable manures, organic waste-derived material, lime, gypsum, and other products exempted by rule. It does include commercial, bulk, custom, and specialty fertilizers.

(3) "Hazardous substance" means any liquid, solid, gas, or sludge, including any material, substance, product, commodity, or waste, regardless of quantity, that exhibits any of the characteristics or criteria of hazardous waste as described in rules adopted under this chapter.

(4) "Hazardous waste" means and includes all dangerous and extremely hazardous waste, including substances composed of both radioactive and hazardous components.

(5) "Label" means the display of all written, printed, or graphic matter on the immediate container, or a statement accompanying a fertilizer.

(6) "Labeling" includes all written, printed, or graphic matter on or accompanying a commercial fertilizer, or advertisement, brochures, posters, television, and radio announcements used in promoting the sale of such fertilizer.

(7) "Liming material" means all suitable materials containing calcium or magnesium in chemical form, physical condition, and

quantity capable of neutralizing soil acidity, which shall include, but need not be limited to, limestone, burnt lime, marl, and industrial by-product meeting the State's hazardous substance standards.

(8) "Organic waste" means grass clippings, leaves, weeds, bark, plantings, prunings, other vegetative wastes, uncontaminated wood waste from logging and milling operations, food wastes, food processing wastes, and materials derived from these wastes through composting.

(9) "Soil amendment" means any substance that is intended to improve the physical characteristics of the soil, except composted material, commercial fertilizers, agricultural liming materials, unmanipulated animal manures, unmanipulated vegetable manures, food wastes, food processing wastes, and materials exempted by rule.

(10) "Waste-derived product" means any fertilizer, agricultural mineral, agricultural amendment or lime product derived in whole or in part from hazardous waste as defined in *[State hazardous waste act]* or in rules adopted thereunder, solid waste as defined in *[State solid waste act]* or in rules adopted thereunder, or industrial waste. "Waste-derived product" does not include:

(a) Biosolids, biosolids-derived products, domestic septage and domestic wastewater treatment facility solids; or

(b) Reclaimed water or treated effluent.

§ 5 Standards

(1) The Administrator shall set the standard for hazardous substances that are not plant nutrients at the lowest level detectible in the fertilizer, soil amendment, or liming material by the State's agricultural laboratory.

(2) The Administrator shall review these standards at a minimum of every five years.[382]

§ 6 Registration Application

(1) No person may sell, offer for sale, or distribute a fertilizer, soil amendment, or liming material in this state until it has been registered with the Department by the producer, importer, or packager of that product.

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[382] OR.REV. STAT. § 633.362(11) (2001).

(2) Not less than ninety days prior to application for registration, the registrant shall submit a two-pound sample to the Department for analysis by the State laboratory.[383]

(a) The sample shall be drawn using the method previously defined for official samples.

(b) The sample shall be marked, certified, and submitted as prescribed by the Administrator at his or her discretion.

(c) The applicant shall pay an analysis fee at the time the sample is submitted. The analysis fee shall be set by the Administrator as he or she deems sufficient to administer the analysis program.

(d) The State laboratory shall have up to ninety days to complete its analysis of each sample submitted under this Act.

(3) An application for registration shall be made on a form furnished by the Department and shall include the following:

the product name;

the brand and grade;

the guaranteed analysis;

registrant's name, address, and phone number;

one copy of the label and labeling for each product being registered;

identification of any product that is a waste-derived fertilizer or contains a controlled substance;

identification of the source of each ingredient material including nutrients, inactive ingredients, and/or fillers; and

the State laboratory's report indicating that the concentration of each hazardous substance for which standards are established is below that standard, in each product being registered.

(4) The fertilizer, soil amendment, or liming material registrant is responsible for proving that their product meets the State standards as a condition of registration.

(5) After the Department receives the completed application, the Administrator shall evaluate whether the use of the proposed fertilizer is consistent with the following:

the Solid Waste Management Act;

the Hazardous Waste Management Act;

this Act, and

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[383] *E.g.*, LA. REV. STAT. ANN. § 3:1026(A) (West 2002).

(d) 42 U.S.C. §§ 6901 et seq. (the Resource Conservation and Recovery Act).

(6) The Administrator shall apply the most stringent standard for any controlled substance.

(7) Such review shall be within sixty days of receiving the completed application, including all information required under this section 3(a) through 3(h) and section 4.

(8) All fertilizers, soil amendments, or liming materials currently registered will not be automatically renewed at the annual expiration. Each product shall follow the new process and meet the new standards before the registration will be renewed.

§ 7 Labels

(1) The Department shall examine the product registration application form, labels, and labeling for conformance with the requirements of this Chapter. In determining whether approval of a labeling statement or ingredient guarantee is appropriate, the Department may require the submission of a written statement describing the methodology of laboratory analysis utilized and any reference material relied upon to support the label statement or ingredient guarantee.

(2) If the application and appropriate labels are in proper form and contain the required information, the particular fertilizer products shall be registered by the Department and a certificate of registration shall be issued to the applicant.

§ 8 Samples

(1) Any State citizen may submit one sample per year for testing, free of charge, if the sample is accompanied by a signed statement: "I certify that I have not previously submitted a sample for free test during the current calendar year (signature)."[384]

(2) Official samples may be initiated by written citizen complaint submitted to the Department.

(3) Upon citizen complaint or upon its own initiative the Department shall inspect, sample, make analysis of, and test fertilizers distributed within this State at such time and place and to such an extent as it may deem necessary to determine whether such fertilizers, soil amendments, or liming material are in compliance with the provisions of this Chapter.

(4) Any purchaser or consumer may take and have a sample of mixed fertilizer or fertilizer material analyzed for available plant

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[384] KY. REV. STAT. ANN. § 250.091 (Banks-Baldwin 2002).

food, if taken in accordance with the following rules and regulations.

(a) At least five days before taking a sample, the purchaser or consumer shall notify the manufacturer or seller of the brand in writing, at the address on the registration application, of the intention to take a sample, and shall request the manufacturer or seller to designate a representative to be present when the sample is taken.

(b) The sample shall be drawn in the presence of the manufacturer, seller, or representative designated by either party, together with two disinterested adult persons, or in case the manufacturer, seller, or representative of either refuses or is unable to witness the drawing of such a sample, a sample may be drawn in the presence of three disinterested adult persons; PROVIDED, that any such sample shall be taken with the same type of sampler as used by the inspector of the Department. A certificate statement in a form which will be prescribed and supplied by the Commissioner must be signed by the parties taking and witnessing the taking of the sample.

(c) Samples drawn in conformity with the requirements of this section shall have the same legal status in the courts of the State, as those drawn by the Department.[385]

§ 9 Adulteration and Mislabeling

(1) No person may distribute an adulterated fertilizer, soil amendment, or liming material within the State.

A fertilizer, soil amendment, or liming material is adulterated if:

(a) it contains any substance in a sufficient amount that may render it injurious to beneficial plant life, animals, humans, aquatic life, soil, or water when applied in accordance with directions for use on the label,[386] or

(b) the source or relative quantity of any ingredient differs from the source or quantity disclosed in the registration application or any additional material requested by the Department in support of the registration process.

No person may distribute a mislabeled fertilizer within the State.

A fertilizer is mislabeled if:

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[385] *See* N.C. GEN. STAT. § 106-662(e)(3) (2002).

[386] *See, e.g.*, IND. CODE § 15-3-3-9(b)(2) (2002).

(a) a waste-derived fertilizer is not designated as such on the label; or

(b) the label or labeling differs in any way from the label or labeling approved by the Department during the registration process.[387]

§ 10 Illegal Acts, Stop Sale, and License Cancellation

(1) It shall be unlawful for any person to:

(a) distribute an adulterated or misbranded commercial fertilizer; or

(b) fail, refuse, or neglect to place upon, or attach to, each package of fertilizer, soil amendment, or liming material distributed within the State a label or labeling identical to that approved by the Department during the registration process.

(2) Such fertilizers, soil amendments, or liming materials are subject to immediate stop sale, use, or removal from distribution in this State, and/or seizure, condemnation, and disposal.

(3) The Department may cancel, revoke, or refuse to register any fertilizer, soil amendment, or liming material, and/or refuse to license a distributor as provided in this Chapter when the Administrator has reasonable cause to believe that the registrant has:

(a) sold, distributed, or used a misbranded or adulterated fertilizer, soil amendment, or liming material; or

(b) been convicted, in this or any other State, of a civil or criminal charge for which a permit may be revoked, suspended, annulled, amended, or refused under this Act.[388]

§ 11 Seizure for Non-Compliance

(1) Any fertilizer, soil amendment, or liming material not in compliance with the provisions of this Chapter shall be subject to seizure on complaint of the Department to a court of competent jurisdiction in the area in which the product is located.

(2) In the event the court finds, upon application by the Department, that a fertilizer violates this Chapter or the rules adopted under it and orders the condemnation of the commercial fertilizer, the fertilizer shall be disposed of in any manner consistent with the quality of the fertilizer and the laws of the State; PROVIDED, that in no instance shall the disposition of the con-

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[387] *See* OR. REV. STAT. § 633.366(3)(c) (2001).

[388] *See* TEX. AGRIC. CODE ANN. § 63.034(1) (Vernon 2001) (implying but not expressly stating that conviction in any state applies).

demned material be ordered by the court without first giving the claimant an opportunity to apply to the court for permission to process or relabel the fertilizer, soil amendment, or liming material to bring it into compliance with this Chapter and the rules adopted under it.

(3) All costs associated with disposal are the responsibility of the distributor, owner, or custodian of the fertilizer, unless such a distributor, owner, or custodian is the consumer or is a person whose role as a distributor, owner, or custodian of the fertilizer is only that of a transporter. A consumer or transporter shall not be responsible for disposal costs. In cases such as these, costs shall be assessed against the registrant, licensee, or the person the court finds caused the fertilizer's, soil amendment's, or liming material's unlawful condition.

(4) No State court shall award damages due to administrative action taken under this Chapter, including refusal to register, registration revocation or cancellation, stop sales, or seizures where the court finds there was probable cause for the administrative action.

(5) Every person who fails to comply with this Chapter, or any rule adopted under it, may be subject to a civil penalty, as determined by the Administrator, in an amount of not more than $7,500 for every such violation. Each and every such violation shall be a separate and distinct offense.[389]

§ 12 Citizen Suit

(1) Any person may commence a civil action on his or her own behalf:

(a) against any person for failure to comply with any provision of this Act, and/or

(b) against the Administrator where there is an alleged failure of the Administrator to perform any act or duty under this Act which is not discretionary; PROVIDED, that sixty days notice shall be given to the Administrator.

§ 13 Public Disclosure

(1) The Department shall publish at least annually and in such form as it may deem proper,

(a) information concerning the distribution of fertilizers, soil amendments, and liming materials; and

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[389] WASH. REV. CODE § 15.54.474 (2003).

results of analyses based on official samples as compared with the analyses guaranteed, noting particularly where the level of a controlled substance exceeds statutory levels.

(2) The published information shall be made available to the public upon request.

(3) The Department and the Administrator, in consultation with the Department of Health, shall biennially prepare a report to the Legislature presenting information on levels of non-nutritive substances in fertilizers, results from Department testing of products that were sampled, and interim or final results from any field studies conducted under the requirements of this Chapter.[390]

[390] WASH. REV. CODE § 15.54.433(3) (2003).