

Toxic Spring: The Capriciousness of Cost-Benefit Analysis Under FIFRA's Pesticide Registration Process and Its Effect on Farmworkers

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Under the Federal Insecticide, Fungicide, and Rodenticide Act, the Environmental Protection Agency (EPA) must conduct a cost-benefit analysis to ascertain whether a pesticide may be sold on the market. This analysis weighs the benefits of using the pesticide against the costs imposed by the pesticide's negative effects, such as health consequences for farmworkers, wild life, consumers, or the environment more generally. Critically, under this analysis, the EPA may not remove pesticides shown to pose "unreasonable adverse risks" to affected parties from the market if the counterbalancing costs of removing those pesticides are too burdensome to industry.

As illustrated by the recent litigation over the pesticide Azinphos-methyl, or AZM, this approach poses serious health risks for those most directly impacted by pesticide regulation: not the consumers whose most substantial encounter with pesticides involves scrubbing pesticidal residues from their store-bought apples under the faucet, but the farmworkers who apply the chemicals in the fields daily and live in pesticide-saturated environments with their children. In the case of AZM, the EPA determined that individuals exposed to the pesticide were at greater risk of suffering neurotoxic harm and that children in particular endured developmental disabilities at greater frequencies. Yet, because immediately prohibiting the usage of AZM would have subtracted what the EPA estimated to be millions of dollars from the agricultural industry's bottom line, the EPA

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concluded that immediate cancellation of the pesticide was not justified and that AZM was to be phased out over a period of six years. This outcome condoned continued farmworker exposure to a chemical with known toxic effects at levels that would not have been tolerated in other regulatory environments.

This Comment argues that the reliability of cost-benefit analysis employed by the EPA, far from being a clear-cut exercise in the weighing of discrete items against one another, too easily erodes in the face of political imperatives, uncertain or unquantifiable public health benefits, and the limits of empiricism and the generation of scientific knowledge itself. The Comment begins by surveying the literature on the health risks of pesticide exposure and explaining the particular vulnerabilities of farmworker communities to under-regulation and pesticide-related health problems. Then, it explores the rationale that underlaid the EPA's decision in the AZM controversy and argues that the decision likely overestimated the benefits of continued pesticide usage to growers and underestimated harms to workers. The Comment concludes by endorsing a more stringent regulatory model, one that uses cost-benefit analysis only in limited circumstances. Such a standard is consistent with the precautionary principle of regulation, which advocates taking action against threatened harm to individuals and ecosystems even in the absence of full scientific certainty. In particular, this Comment argues for a system of regulation that more closely approximates California's regulatory scheme, which considers benefits in the registration process only in limited circumstances. It also argues that the EPA should adopt a number of novel regulatory strategies implemented by the European system of pesticide regulation: Registration, Evaluation, Authorization and Restriction of Chemical Substances (REACH)—in short, a system that, inter alia, incentivizes the substitution of alternatives for suspect chemicals and requires informational disclosures as a way to activate market pressures on companies.

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INTRODUCTION

Emergency crews came into their house, where my friend and her husband were having difficulty breathing, where the children were on the floor throwing up. And the crew said, “Nothing’s wrong here, we don’t smell anything.” The ambulance was across the street, and she said she didn’t know if she was going to live or die. No one helped them. She said that their neighbor chased the ambulance, but they laughed at him and drove away.¹

Reports of pesticide drift incidences, such as the one described above, are common in the small towns and communities that border the farms for which most residents work. In the Lamont drift accident, a highly toxic soil fumigant, which drifted from an onion field located a quarter of a mile away, caused at

1. Jill Harrison, *Abandoned Bodies and Spaces of Sacrifice: Pesticide Drift Activism and the Contestation of Neoliberal Environmental Politics in California*, 39 *GEOFORUM* 1197, 1197 (2008) (recalling statements from a resident-activist who described the October 2003 pesticide drift incident experienced by a friend in Lamont, California).

least twenty-four residents to suffer a range of acute toxicity symptoms, including nausea, vomiting, blurred vision, and impaired and painful breathing.² Medical personnel, summoned to the scene, dismissed the symptoms of the residents as insufficiently serious and ordered the residents to return home and air out their houses.³ The next day, a second application of the same fumigant sickened over two hundred residents of the same town.⁴

“Pesticides are poisons. They are designed to kill things.”⁵ Their benefits to consumers and the agricultural industry—measured by quantities of insects killed, increased yields in food commodities, and correspondingly lower prices of basic food staples⁶—are sizeable and should not be ignored. But the tolls of pesticide application are widespread and serious. Pesticide drift occurs when pesticide particles applied at one location are transmitted through the air or water to any other location.⁷ Drift can cause adverse effects on human health and the environment.⁸ Estimates place the amount of pesticide active ingredients wasted to drift per year at seventy million pounds.⁹ Thousands of complaints about pesticide drift are filed each year with state and local agencies, which spend significant resources investigating those complaints.¹⁰ Negative and unintended consequences of pesticide usage include contaminated land and water; decreased soil quality; ecological harm to non-target animals, aquatic organisms, and beneficial insects; increased resistance among pests (resulting in super-pests); and poisonings and chronic health problems among human beings who suffer exposure.¹¹

Nowhere is the price of pesticide usage more devastating than in its effect on the workers who apply the chemicals to crops and who work day after day in pesticide-saturated fields with their children. A central problem in pesticide regulation is that the federal law that governs worker exposure to pesticides, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), allows for the use of a pesticide even when it has been shown to pose serious risks to the health of workers.¹² The EPA mandate under the law requires it to determine if

2. *Id.*

3. *Id.*

4. *Id.*

5. JENNIFER SASS & MAE WU, NAT. RES. DEF. COUNCIL, *SUPERFICIAL SAFEGUARDS: MOST PESTICIDES ARE APPROVED BY FLAWED EPA PROCESS* 2 (2013), <http://www.nrdc.org/health/pesticides/files/flawed-epa-approval-process-IB.pdf>.

6. See Md. Wasim Aktar et al., *Impact Of Pesticides Use in Agriculture: Their Benefits and Hazards*, 2 *INTERDISC. TOXICOLOGY* 1 (2009).

7. *Introduction to Pesticide Drift*, EPA (Oct. 15, 2014), <http://www2.epa.gov/reducing-pesticide-drift/introduction-pesticide-drift>.

8. *Id.*

9. *Id.*

10. *Id.*

11. David Pimentel et al., *Environmental and Economic Costs of Pesticide Use*, 42 *BIOSCIENCE* 750 (1992).

12. See 7 U.S.C. § 136a(a) (2012) (noting that “[t]o the extent necessary to prevent unreasonable adverse effects on the environment, the Administrator may by regulation limit the

a pesticide will pose “unreasonable adverse risks” to humans and the environment.¹³ If such risks exist, the EPA will not allow for the pesticide’s use. But, the “unreasonable adverse risks” standard encompasses not only the costs of the pesticide, but also its benefits.¹⁴ This means that if the benefits of continued usage of a pesticide outweigh the pesticide’s health costs, the EPA may permit its continued sale on the market. Thus, the EPA could condone the continued usage of a pesticide whose removal from the market would cause growers to suffer economic losses, even if the pesticide posed serious risks to farmworker health.

This exact scenario occurred in the recent litigation over the pesticide Azinphos-methyl, or AZM.¹⁵ The EPA conducted a cost-benefit analysis for the pesticide and concluded, disquietingly, that AZM’s benefits outweighed its substantial risks to farmworkers.¹⁶ But, as this Comment will demonstrate, a closer examination of the EPA’s analysis suggests that the EPA overestimated benefits to growers and underestimated risks to workers. The end result—continued farmworker exposure to a pesticide whose documented effects include neurotoxic harm and other symptoms associated with central nervous system poisoning¹⁷—can only be described as a shocking injustice.

This Comment aims to direct a much-needed spotlight on the problem of cost-benefit analysis in the pesticides context. In particular, it endeavors to do so by examining the application of cost-benefit analysis in the re-registration of the pesticide AZM, which has not previously been explored in the legal literature. After the controversies over DDT usage concluded in the seventies with the cancellation of DDT,¹⁸ the topic of pesticide evaluations has largely failed to garner attention in either the popular media or among legal scholars. Among scholars, especially, only two articles have addressed the topic head-on, and neither examines cancellations or registrations of specific pesticides

distribution, sale, or use in any State of any pesticide”); 7 U.S.C. § 136(bb) (defining “unreasonable adverse effects on the environment” to refer to both the costs and benefits of a pesticide).

13. See 7 U.S.C. § 136a(c)(5); see also 7 U.S.C. § 136(bb) (defining “unreasonable adverse effects on the environment” to include risks to humans and the environment).

14. See 7 U.S.C. § 136(bb) (defining “unreasonable adverse effects on the environment” to refer to both the costs and benefits of a pesticide).

15. See *United Farmworkers of Am. v. EPA*, No. C04-099RSM, 2008 WL 2117114, at *2 (W.D. Wash. May 19, 2008), *aff’d*, 592 F.3d 1080 (9th Cir. 2010).

16. See EPA, INTERIM RE-REGISTRATION ELIGIBILITY DECISION FOR AZINPHOS-METHYL 13 (Oct. 30, 2001) [hereinafter IRED 2001].

17. See *Pesticide Information Profiles: Azinphos Methyl*, EXTENSION TOXICOLOGY NETWORK, <http://extoxnet.orst.edu/pips/azinopho.htm> (last visited June 15, 2015).

18. See *DDT Regulatory History: A Brief Survey (to 1975)*, EPA (Jul. 1975), <http://www2.epa.gov/aboutepa/ddt-regulatory-history-brief-survey-1975>. The “cancellation” of a pesticide is a protracted process initiated by EPA aimed ultimately at the removal of the pesticide from the market. See *id.*

under the modern EPA of the Bush or Obama administrations.¹⁹ But scholars would be remiss in continuing to ignore the problems posed by cost-benefit analysis in the face of mounting evidence that faulty implementation of other segments of FIFRA's registration process has created large bureaucratic loopholes allowing for the registration of even those pesticides that lack adequate safety data to prove their efficacy and safety.²⁰

Scholarly and public attention to the topic is especially warranted given a recent investigation exposing fundamental flaws in the EPA's pesticide registration process. Published in 2013, a National Resources Defense Council (NRDC) report revealed that, through a process known as "conditional registration," the EPA had registered "more than 11,000—about 65 percent—of the 16,000-plus currently active pesticide products," even though these pesticides had not been fully tested to ensure that they posed no threat to human health or the environment.²¹ Conditional registration, which allows a new active ingredient to enter the market for an unspecified period of time while the registrant generates missing data, is only supposed to be used in special situations, such as those involving public health emergencies.²²

However, the EPA's own analysis found that it had misused the conditional registration provision for other registration activities up to 98 percent of the time between 2004 and 2010.²³ A year later, the Government Accountability Office (GAO) released a fifty-four-page report reprimanding the EPA for its misuse of conditional registration.²⁴ As of July 2013, EPA officials told GAO that the agency had "taken or [was] planning to take several actions to more accurately account for conditional registrations."²⁵ Nevertheless, doubts persist as to the safety of certain controversial pesticides that remain on the market, such as nanosilver and clothianidin, and regarding how long re-categorizing and properly registering thousands of pesticides would take.²⁶

The conditional registration loophole implicates the problem of cost-benefit analysis under FIFRA, because pesticides that are conditionally registered must undergo the onerous cancellation process before they can be

19. See Mary Jane Angelo, *Embracing Uncertainty, Complexity, and Change: An Eco-Pragmatic Reinvention of a First-Generation Environmental Law*, 33 *ECOLOGY L.Q.* 105 (2006); Marina M. Lolley, Comment, *Carcinogen Roulette: The Game Played Under FIFRA*, 49 *MD. L. REV.* 975, 991 (1990).

20. SASS & WU, *supra* note 5, at 2.

21. *Id.*

22. *Id.*

23. *Conditional Pesticide Registration*, EPA (Feb. 17, 2015), <http://www2.epa.gov/pesticide-registration/conditional-pesticide-registration>.

24. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-13-145, PESTICIDES: EPA SHOULD TAKE STEPS TO IMPROVE ITS OVERSIGHT OF CONDITIONAL REGISTRATIONS (2013), <http://www.gao.gov/assets/660/656825.pdf>.

25. *Id.* at 12.

26. See SASS & WU, *supra* note 5, at 3–4.

removed from the market. If a pesticide that is presumed to be non-harmful under the permissive conditional registration process must be *proved* harmful in order for the pesticide to be removed from the market, the government will consume significant resources making this determination. In short, the Agency's imperative to conduct cost-benefit analysis will only slow the removal of pesticides that should not have been registered in the first place. More broadly, the two issues represent different facets of the same problem—both processes obstruct the EPA's ability to effectively regulate pesticides.

This Comment surveys the problem of regulating pesticide exposure from the perspective of the AZM cancellation proceedings and concludes that a system of pesticide regulation akin to California's approach, as well as to the European system REACH, would be more protective of worker and consumer health. First, it describes the prevalence of pesticide usage, its health effects, and the special vulnerability of farmworker communities. The subsequent Parts detail the EPA's general approach to cost-benefit analysis and examine the EPA's cost-benefit analysis of AZM. This Comment argues that the EPA wrongly performed its analysis with regard to the economic costs of removing the pesticide, as well as with regard to the efficacy of the mitigation measures proposed to reduce health risks to workers. It will draw upon FIFRA's legislative history and the California Department of Pesticide Regulation's own registration process, which does not consider the benefits of a pesticide, to propose that the benefits of a pesticide should be considered in only very limited circumstances. Otherwise, the EPA's current approach to cost-benefit analysis will continue to systematically undervalue the lives of farmworkers and condone the kind of worker exposure that would in all likelihood be prohibited in any other industry or line of work.

I.

FARMWORKERS AND PESTICIDE EXPOSURE

A. *Pesticide Poisoning Incidents Are Widely Under-Reported*

An EPA slideshow presentation in 2006 began with the question: "How many occupational pesticide incidents are there each year in the United States?"²⁷ The slide listed multiple possibilities, from thirteen hundred to three hundred thousand.²⁸ The answer was that there was no answer. Each number could be true, the report said. It just depends on the source you consult.²⁹

Pesticide poisoning is an endemic problem among farmworker populations in the United States. There are an estimated 2.5 million hired crop

27. PESTICIDE PROGRAM DIALOGUE COMM., EPA, OCCUPATIONAL PESTICIDE INCIDENT PROJECT (June 2006), <http://www.epa.gov/oppfead1/cb/ppdc/2006/june06/session7-occup.pdf>.

28. *Id.*

29. *Id.*

farmworkers in the United States.³⁰ An estimated 60 percent of these farmworkers and their dependents live in poverty.³¹ Most farmworkers—88 percent—are Hispanic.³² In 2007, a U.S. Department of Labor report found that agriculture was the most dangerous industry sector in the United States in terms of its occupational fatality rate.³³ Farmworkers suffer more injuries and illnesses caused by exposure to pesticide chemicals than any other workforce in the country.³⁴ In 1992, the EPA's official estimate was that there were roughly twenty thousand incidents of farmworker poisoning by pesticides.³⁵ A more recent study estimated an average incident rate of 57.6 out of every 100,000 agricultural workers in which workers experience acute pesticide poisoning, illness, or injury each year.³⁶

However, the real poisoning rate for agricultural workers is likely much higher than estimates, because farmworker pesticide poisoning is underreported. This is due to a complex web of inter-related factors. First, there is no national surveillance system for acute pesticide illness reporting.³⁷ Second, there is no surveillance system for tracking chronic illness related to pesticide exposure.³⁸ In 1993, in fact, the GAO issued a report about the EPA's failure to track occupational exposure data.³⁹ Such a failure, in GAO's opinion, could lead to a "significant underestimation of both the frequency and the severity of pesticide illnesses."⁴⁰ Despite promises to gather more information and create a more consistent means of tracking incidents, the EPA has not

30. FARMWORKER JUSTICE, EXPOSED AND IGNORED: HOW PESTICIDES ARE ENDANGERING OUR NATION'S FARMWORKERS 8 (2013) [hereinafter FARMWORKER JUSTICE], <http://kresge.org/sites/default/files/Exposed-and-ignored-Farmworker-Justice-KF.pdf>.

31. *Id.*

32. *Id.*

33. Press Release, Bureau of Labor Statistics, U.S. Dep't of Labor, National Census of Fatal Occupational Injuries in 2007, at 3 (Aug. 20, 2008), http://www.bls.gov/news.release/archives/cfoi_08202008.pdf.

34. FARMWORKER JUSTICE, *supra* note 30, at 6.

35. EPA, REGULATORY IMPACT ANALYSIS OF WORKER PROTECTION STANDARD FOR AGRICULTURAL PESTICIDES 11 (1992).

36. Geoffrey M. Calvert et al., *Acute Pesticide Poisoning Among Agricultural Workers in the United States, 1998–2005*, 51 AM. J. INDUS. MED. 883, 890 (2008).

37. *Pesticide Safety*, FARMWORKERJUSTICE.ORG, <http://www.farmworkerjustice.org/content/pesticide-safety> (last visited June 15, 2015).

38. *Id.*

39. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO/PEMD-94-6, PESTICIDES ON FARMS: LIMITED CAPABILITY EXISTS TO MONITOR OCCUPATIONAL ILLNESSES AND INJURIES 3 (1993), <http://www.gao.gov/products/PEMD-94-6>.

40. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO/RCED-00-40, PESTICIDES: IMPROVEMENTS NEEDED TO ENSURE THE SAFETY OF FARMWORKERS AND THEIR CHILDREN (Mar. 14, 2000), <http://www.gpo.gov/fdsys/pkg/GAOREPORTS-RCED-00-40/html/GAOREPORTS-RCED-00-40.htm>.

implemented any improvements.⁴¹ Instead, the EPA continues to rely on states to report complaints,⁴² but states, by and large, do not make them.⁴³

Additionally, health effects of pesticide exposure may prove difficult to detect for even the most vigilant of health monitors—especially if a significant time delay exists between the exposure and its effect or exposures to other ingredients occurred during the delay.⁴⁴ Many health effects do not manifest for a substantial period of time after the initial exposure. The problem of adducing causality adds another layer of difficulty to the epidemiological inquiry. It is difficult to prove that exposure to a particular chemical causes a certain illness when a worker has also suffered exposure to a variety of other chemicals, and the effects of exposure to any or all of these chemicals are as yet unknown, whether alone or in combination.⁴⁵

For farmworkers, cultural and linguistic barriers are amongst the most insurmountable barriers to protecting their health against pesticide exposure. According to a recent U.S. Department of Labor survey, the mean highest grade level attained by farmworkers was seventh grade.⁴⁶ Forty-four percent of workers surveyed said they could not speak English “at all,” while 53 percent stated they could not read the language.⁴⁷ Not only does this lack of English proficiency render workers less able to read the safety instructions on pesticide products (which advocates argue subjects workers to higher risks of exposure),⁴⁸ it could also discourage workers from seeking medical attention. Even those who attempt to procure medical care face obstacles—including the lack of health insurance and the lack of adequate transportation.⁴⁹

The immigration status of farmworkers poses an additional problem for those seeking to protect themselves from exposure. While some farmworkers are migrant workers or legal residents, more than half are immigrants who lack

41. Ronnie Greene, *Farmworkers Plagued by Pesticides, Red Tape*, CTR. FOR PUB. INTEGRITY (June 25, 2012, 6:00 AM) (updated May 19, 2014, 12:19 PM), <http://www.publicintegrity.org/2012/06/25/9159/farmworkers-plagued-pesticides-red-tape>.

42. *Id.*

43. In one year, for example, North Carolina reported five investigations based on worker complaints for the entire state. *Id.* Tennessee listed three. *Id.* And South Carolina, a major agricultural producer, did not report pesticide poisonings at all. *Id.*

44. UNIV. OF KY. COLL. OF AGRIC., FOOD & ENV'T., PESTICIDES - HARMFUL EFFECTS AND EMERGENCY RESPONSE 4, <http://pest.ca.uky.edu/EXT/ukgh/Exposure.pdf> (last visited June 15, 2015).

45. Bridget Huber, *Will EPA Help Farmers Fight Pesticide Poisoning?*, GRIST (June 18, 2011), <http://grist.org/industrial-agriculture/2011-06-22-public-health-advocates-urge-epa-to-require-pesticide-makers>.

46. DANIEL CARROLL ET AL., U.S. DEP'T OF LABOR, FINDINGS FROM THE NATIONAL AGRICULTURAL WORKERS SURVEY 2001–2002: A DEMOGRAPHIC AND EMPLOYMENT PROFILE OF UNITED STATES FARM WORKERS 18 (Mar. 2005).

47. *Id.* at 21.

48. FARMWORKER JUSTICE, *supra* note 30, at 10 (observing that pesticide handlers who were not proficient in reading English showed significantly higher pesticide exposure than handlers who could read English to a greater degree).

49. See Joan D. Flocks, *The Environmental and Social Injustice of Farmworker Pesticide Exposure*, 19 GEO. J. ON POVERTY L. & POL'Y 255, 259 (2012).

legal documentation.⁵⁰ Some employers, fully aware of these immigrants' precarious legal status, threaten to report workers to immigration officials if the workers protest their working conditions.⁵¹ One survey of New Mexico farmworkers describes an ultimatum posed by managers to workers: the workers would lose their jobs if they refused to work in direct contact with pesticides.⁵² When a group of farmworkers in Tennessee complained to state regulators about their employer's illegal spraying practices, the employer terminated the workers on the spot and attempted to have them deported.⁵³ These incidents are not rare, one-off occurrences. Unsurprisingly, then, workers are reluctant to publicize their complaints: "When you tell them, 'Let's make this paper and put your name on it so we can make a difference,' they just won't do it," one worker advocate said. "I don't have any papers. I have to work. This is the only way I can feed my family."⁵⁴

Ultimately, this dearth of information on pesticide poisoning means that it is exceedingly difficult to hold the government and the industry accountable for occupational injuries that workers incur in the fields.

*B. The Under-Regulation Inherent in "Agricultural Exceptionalism"
Increases the Likelihood of Pesticide Exposure*

Farmworkers as a whole are an exceptionally under-regulated group within the workforce.⁵⁵ This under-regulation intensifies their vulnerability to pesticide exposure. Farmworkers have long been accorded little to no protection under major federal employment statutes. For example, the National Labor Relations Act (NLRA) explicitly excludes farmworkers, rendering it extremely difficult for farmworkers to organize without legal protection against employer retribution.⁵⁶

Farmworkers were also originally excluded from the Fair Labor Standards Act (FLSA), until Congress's 1966 amendments extended the Act's minimum wage and overtime provisions to the majority of farmworkers.⁵⁷ However,

50. Aviva Shen, *Farm Workers Demand Protections from Pesticide Poisoning*, THINKPROGRESS (July 16, 2013, 12:38 PM), <http://thinkprogress.org/immigration/2013/07/16/2307921/farm-workers-pesticide-poisoning>.

51. *Id.*

52. *Id.*

53. Greene, *supra* note 41.

54. *Id.* (quoting Yolanda Gomez).

55. See Juliana Garcia, Comment, *Invisible Behind A Bandana: U-Visa Solution for Sexual Harassment of Female Farmworkers*, 46 U.S.F. L. REV. 855, 865–69 (2012) (describing the phenomenon of agricultural exceptionalism and the history of farmworker exclusion from protective regulation); see also Flocks, *supra* note 49, at 264 (noting that "for farmworkers, regulations that directly involve pesticide exposure are often nonexistent, ineffective, or unenforced").

56. See 29 U.S.C. § 152(3) (2012) ("The term 'employee' . . . shall not include any individual employed as an agricultural laborer . . .").

57. See S. REP. NO. 89-1487 (1966), as reprinted in 1966 U.S.C.C.A.N. 3002, 3006; Juan F. Perea, *A Brief History of Race and the U.S.-Mexican Border: Tracing the Trajectories of Conquest*, 51 UCLA L. REV. 283, 308 (2003).

FLSA continues to regulate the employers of farmworkers more leniently than employers in other occupations.⁵⁸ For example, particular groups of farmworkers are entirely exempt from FLSA's overtime compensation protection.⁵⁹ Additionally, employers do not have to pay both minimum wage and overtime pay to agricultural workers who work on small farms or perform seasonal work.⁶⁰ Also, FLSA expressly exempts child farmworkers from numerous protective provisions.⁶¹ Under these exemptions, children younger than twelve can work on their parents' farms, children between the ages of twelve and thirteen can work with parental consent, and children aged fourteen and older can work without consent.⁶²

The Occupational Safety and Hazards Act (OSHA) regulates workplace health and safety, but this law, like others, also fails to extend adequate protections to farmworkers. OSHA, for example, grants no private right of action.⁶³ The statute's implementing agency, the Occupational Safety and Health Administration, also under-enforces the law.⁶⁴ Additionally, because OSHA excludes farmworkers from its pesticide safety provisions, OSHA's comparatively strong protections for workers engaged in hazardous working conditions are unavailable to farmworkers who would otherwise use the law as a shield against unsafe workplace exposures.⁶⁵

Encouragingly, the passage of the Migrant and Seasonal Agricultural Worker Protection Act (MSPA)⁶⁶ represented a significant step forward in the quest to provide farmworkers with more robust protections. The Act requires employers to inform workers about the terms and conditions of their employment,⁶⁷ post signs about worker protections at the workplace,⁶⁸ comply

58. See Autumn L. Canny, *Lost in a Loophole: The Fair Labor Standards Act's Exemption of Agricultural Workers from Overtime Compensation Protection*, 10 *DRAKE J. AGRIC. L.* 355, 365 (2005) (observing that "early federal and state employment laws broadly exempted agricultural workers from protections afforded other workers").

59. See *id.* at 356; 29 U.S.C. § 213(a)(6).

60. 29 U.S.C. § 213(a)(6)(A).

61. *Id.* § 213(c)(1)(A)–(C).

62. See *id.*

63. See *id.* § 653(b)(4).

64. See LAURIE L. LEVENSON & ALEX RICCIARDULLI, *RUTTER GROUP—CALIFORNIA CRIMINAL LAW* § 10:28 (2014–2015 ed.) (observing that "[b]ecause of limited personnel," Cal/OSH Act inspections are based on the following priorities: "imminent danger or serious violation situations"; "catastrophes and fatal accidents"; "employee complaints"; "high hazardous industry" inspections"; and "reinspections").

65. See Keith Cunningham-Parmeter, *A Poisoned Field: Farmworkers, Pesticide Exposure, and Tort Recovery in an Era of Regulatory Failure*, 28 *N.Y.U. REV. L. & SOC. CHANGE* 431, 466 (2004) (observing that "although the Hazard Communication Standard mandates measures such as informing office workers of their printer toner's toxicity, OSHA does not mandate educating farmworkers about the much greater toxic dangers they encounter in their workplaces." (footnote omitted)).

66. Pub. L. No. 97-470, 96 Stat. 2583 (1983) (codified at 29 U.S.C. §§ 1801–1872).

67. See 29 U.S.C. § 1821(a).

68. See *id.* § 1821(b).

with the terms of any “working arrangements” made with workers,⁶⁹ and ensure that worker housing, if provided, meets certain minimum building and safety standards.⁷⁰ The statute also grants a private right of action.⁷¹ However, the MSPA suffers from weaknesses similar to those of statutes like OSHA, namely that its protective provisions are useless unless invoked. For example, the Department of Labor, which bears whole responsibility for enforcing the law, has long faced criticism for under-enforcing the law due to inadequate staffing.⁷²

The congressionally authorized under-regulation of farmworkers in the spheres of collective action, wage and hour law, and occupational safety described above are examples of “agricultural exceptionalism.” Agricultural exceptionalism exempts agriculture from social, labor, health, and safety regulations and promotes the unequal and disparate treatment of farmworkers.⁷³ This treatment has its roots in historical precedents. Because of the sector’s economic, social, and cultural primacy in the earliest periods of American legal history and its close linkages with the quintessentially American mythology of bootstrap individualism, Congress continuously promoted the sector’s economic health through a wide realm of public entitlements.⁷⁴ These entitlements continue into the present day and are linked to agriculture’s special status in the nation’s memory.⁷⁵

Justifications for protecting American agriculture mostly concern the importance of preserving economic advantage: since consumers are entitled to an “adequate and steady supply of [] commodities at fair prices,”⁷⁶ providing agricultural employers with a steady supply of flexible, low-wage labor maintains maximum economic benefits in the sector.⁷⁷ This perspective persists in modern times. The twin ideas that consumers are entitled to “fair prices,” and that industry retains a right to do business in a regulatory regime that encourages rather than inhibits economic competitiveness, underwrite much of the differential approaches to standard setting seen in statutes that involve

69. See *id.* § 1822(c).

70. See *id.* § 1823.

71. See *id.* § 1854.

72. See Jane Younglove Lapp, *The Migrant and Seasonal Agricultural Worker Protection Act: “Rumors of My Death Have Been Greatly Exaggerated,”* 3 SAN JOAQUIN AGRIC. L. REV. 173, 178 (1993).

73. See, e.g., Guadalupe T. Luna, *An Infinite Distance?: Agricultural Exceptionalism and Agricultural Labor*, 1 U. PA. J. LAB. & EMP. L. 487, 489 (1998).

74. See Jim Chen, *The American Ideology*, 48 VAND. L. REV. 809, 818 (1995).

75. *Id.*; see also 29 U.S.C. § 213(a)(6) (exempting specific categories of farmworkers from FLSA’s overtime compensation protection); *id.* § 213(c)(1)(A)–(C) (exempting child farmworkers from numerous protective provisions).

76. 7 U.S.C. § 1282 (2012).

77. See Wayne A. Grove, *The Mexican Farm Labor Program, 1942–1964: Government-Administered Labor Market Insurance for Farmers*, 70 AGRIC. HIST. SOC’Y 302, 302 (1996) (“[G]rowers have used their political, economic, and social powers to reduce the cost of production most amenable to their influence: labor.”).

farmworkers, on the one hand, and statutes that implicate consumer safety, on the other.⁷⁸

In sum, congressionally condoned under-regulation of farmworkers occurs on a multitude of levels and aggravates worker vulnerability to exposure by depriving farmworkers of rights that would otherwise enable them to improve the harsh environments in which they work. The inadequate regulation of farmworkers' exposure to pesticides is simply another facet of agricultural exceptionalism.

C. *Exposure Is Unavoidable for Farmworkers*

Pesticide usage is extremely prevalent among U.S. growers. The EPA estimates that pesticide expenditures totaled \$11.8 billion in 2006 and \$12.5 billion in 2007, with expenditures in the agriculture sector accounting for nearly two-thirds of total expenditures in both years.⁷⁹ In all, approximately 5.1 billion pounds of pesticides are used annually in the United States.⁸⁰

Given the heavy application of pesticides on farms, farmworkers come into contact with pesticides in a variety of ways. Pesticides saturate the environments in which farmworkers perform their daily labor. Workers who mix, load, and apply pesticides may become exposed through spills and splashes of pesticides.⁸¹ Protective gear that is meant to protect workers from exposure may not achieve that goal if the gear is defective or inadequate—or if employers fail to provide protective gear in the first place.⁸² Workers who labor in the fields picking or weeding plants may expose themselves through pesticide drift, through direct spray, or through contact with pesticide residues on the crop or soil.⁸³

In some instances, a particular method for harvesting a crop may necessitate that workers breathe in the pesticide throughout the duration of their workday.⁸⁴ One worker, Graciela, tells the story of how her daughter contracted leukemia after working alongside her mother on a farm in Florida.

I think now about how the very nature of cutting ferns exposes me to pesticides. . . . First of all, we are working under these tarps every day, and because they are so low down, the chemicals can't really escape into the air. And in order to cut the ferns and get those nice long stems that we need, we have to put our faces practically down into them. I

78. For example, the Food Quality Protection Act implements a far more stringent standard of safety to protect consumers of food pesticides. *See* 21 U.S.C. § 346a(b)(2) (2012). For further discussion of this law, see Part IV.B.

79. *2006–2007 Pesticide Market Estimates: Sales*, EPA (July 19, 2013), <http://www.epa.gov/opp00001/pestsales/07pestsales/sales2007.htm>.

80. *Id.*

81. FARMWORKER JUSTICE, *supra* note 30, at 6.

82. *Id.*

83. *Id.*

84. *See* Shen, *supra* note 50.

realize now how dangerous this is. We are breathing in those pesticides all day long, and how could they not cause us harm.⁸⁵

The children of farmworkers are also routinely exposed to pesticides.⁸⁶ Children often accompany their parents during agricultural work.⁸⁷ In fact, children as young as ten can legally work in the fields with written parental consent.⁸⁸ One report estimated that at least a hundred and twenty-nine thousand fourteen- to seventeen- year-olds were hired to work in crop production in the year 1998.⁸⁹ In practice, however, children work at even younger ages. In 2000, the GAO reported that 7 percent of farmworkers with children five years of age or younger took their children with them when they worked, likely due to the lack of day care options.⁹⁰ The EPA also released a recent policy paper examining the heightened risks of child worker exposure to pesticides.⁹¹ The children of farmworkers may also come into contact with pesticides when they play in pesticide-treated fields or put objects such as toys or household implements in their mouths.⁹²

Pesticide exposure at such an early age is cause for special alarm, because children's unique physiology renders them exceptionally vulnerable to pesticide risks.⁹³ Children have different exposure rates, sensitivities, and reactions to pesticide exposure due to neurological, biological, and social characteristics specific to children.⁹⁴ For example, children breathe in more air in relation to their body weight compared to adults, thereby absorbing a higher concentration of pesticides while working in fields.⁹⁵

Exposure is not confined to the fields. Pesticides may drift into neighboring schools, residences, and communities.⁹⁶ Workers may take home

85. *Id.*

86. FRANK ACKERMAN, POISONED FOR PENNIES: THE ECONOMICS OF TOXICS AND PRECAUTION 119 (2008). This is because the Fair Labor Standards Act—the federal law that governs minimum wage, overtime pay, and the conditions under which child labor is permissible—expressly allows children to work in the agricultural industry from an early age. See Part II.B for an extended discussion of this law, and others, that under-regulate the farmworker populace.

87. *Id.*

88. See 29 U.S.C. § 213(c)(1)(A)–(C) (2012).

89. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO/RCED-00-40, *supra* note 40, at 6.

90. *Id.* (observing that “farmworker children [are] forced to suffer long hours in the fields with both parents working and [virtually] no day care alternatives” (quoting a 1999 report from the Department of Labor’s Wage and Hour Division) (alterations in original)).

91. See OFFICE OF PESTICIDE PROGRAMS, EPA, REVISED RISK ASSESSMENT METHODS FOR WORKERS, CHILDREN OF WORKERS IN AGRICULTURAL FIELDS, AND PESTICIDES WITH NO FOOD USES (Dec. 7, 2009), <http://www.epa.gov/pesticides/health/revisedRAMethods.pdf>.

92. *Pesticide Safety*, *supra* note 37.

93. See *Children Are At Greater Risks from Pesticide Exposure*, EPA (Jan. 2002) (last updated May 9, 2012), <http://www.epa.gov/pesticides/factsheets/kidpesticide.htm>.

94. See Exec. Order No. 13,045, 62 Fed. Reg. 19,885 (Apr. 21, 1997).

95. *Id.*

96. Broadly defined, pesticide drift is the airborne movement of pesticides away from the pesticide’s intended target—that is, to any site other than that intended for application. OFFICE OF PREVENTION, PESTICIDES & TOXIC SUBSTANCES, EPA, SPRAY DRIFT OF PESTICIDES (Dec. 1999),

pesticides on their hair, skin, or clothing.⁹⁷ Clothes that are worn in the fields and discarded into a laundry hamper with the clothes of other family members may pose dangers to the entire family if the whole batch of clothing is inadequately washed. Advocates have even advised workers to refrain from hugging or otherwise touching their children when they come home from work if they have not taken a shower and changed into clean clothes.⁹⁸

As one farmworker advocate testified, “[t]he close proximity of agricultural fields to residential areas and schools makes it nearly impossible for farmworkers and their families to escape exposure because pesticides are in the air they breathe and the food they eat, and the soil where they work and play.”⁹⁹ Accordingly, near-constant exposure is unavoidable.

D. Both the Short- and Long-Term Effects of Pesticide Exposure Can be Severe

The negative results of exposure, though difficult to trace to any single source, are cumulatively staggering. The life expectancy of migrant farmworkers, for example, is forty-nine years.¹⁰⁰ The national average, by contrast, is seventy-five years.¹⁰¹ The difference can be attributed to acute and chronic pesticide illness, as well as to workplace injuries caused by pesticide exposure.¹⁰²

Illnesses caused by pesticide exposure take many different forms. Acute effects of poisoning include rash, eye irritation, dizziness, nausea and vomiting, and headaches.¹⁰³ Serious acute effects include breathing difficulties, seizures, loss of consciousness, and death.¹⁰⁴ Documented long-term effects include cancer, neurological disorders, hormonal and reproductive health problems, birth defects, and infertility.¹⁰⁵ Researchers examining the effects of exposure have found associations with leukemia and lymphoma, as well as brain, kidney,

<http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=200002PC.txt>. Beside the transmittal of pesticide droplets or particles through the air, however, pesticides also infuse soil systems and water channels. The extent and variability of the drift depends on the application method used to spread the pesticide, the pesticide type, and the medium of conveyance.

97. FARMWORKER JUSTICE, *supra* note 30, at 6.

98. Bruce Goldstein, *Protecting Farmworkers from Toxic Pesticide Exposure*, THE HILL (July 15, 2013, 3:00 PM), <http://thehill.com/blogs/congress-blog/healthcare/310757-protecting-farmworkers-from-toxic-pesticide-exposure>.

99. Shen, *supra* note 50 (quoting Occupational and Environmental Health Director of Farmworker Justice Virginia Ruiz).

100. Sonia Sandhaus, *Migrant Health: A Harvest of Poverty*, AM. J. NURSING, Sept. 1998, at 52, 52.

101. *Id.*

102. *See id.*

103. *Pesticide Safety*, *supra* note 37.

104. *Id.*

105. *Id.*

breast, prostate, pancreas, liver, lung, and skin cancers.¹⁰⁶ Additionally, lifetime cancer risks are much higher for farmworkers who apply pesticides than for consumers of foods. One study estimated that farmworkers were exposed to a median estimated incremental lifetime cancer risk of 1 in 100,000, while the same risk for consumers is only 2.3 in 100,000,000.¹⁰⁷

Pesticides also have negative effects on the reproductive health of workers and their families. When pregnant mothers are exposed to pesticides, their children have a heightened risk of leukemia, Wilms's tumor, and brain cancer.¹⁰⁸ Other documented risks include fetal deformities, miscarriages, or lowered sperm count.¹⁰⁹ As previously discussed, children are especially vulnerable to the health effects of pesticide exposure. One U.C. Berkeley study found that children who had been exposed to pesticides in the womb were more likely to encounter mental development and pervasive developmental problems by twenty-four months of age.¹¹⁰ Other studies have also found that a decrease in IQ scores was more likely to occur with exposure.¹¹¹

Finally, the lack of data on the effects of many pesticides—as well as the lack of data on how various types of pesticides, once ingested, interact within the body—suggests that these documented effects are only the tip of the iceberg. Since so much is unknown about the health risks of pesticides, policy makers should adopt a precautionary approach to preventing potential harm. However, the pesticide registration process under FIFRA not only proceeds under the presumption that the pesticide under review is efficacious and safe, but it also allows for the continued use of pesticides that are known to cause harms under its problematic cost-benefit analysis.

II.

OVERVIEW: THE FIFRA REGISTRATION PROCESS

FIFRA is the federal law that regulates pesticide manufacture, labeling, sale, and usage in the United States.¹¹² It enables the EPA to regulate pesticides that affect farmworkers in primarily two ways: through the Worker Protection

106. Robyn C. Gilden et al., *Pesticides and Health Risks*, 39 J. OBSTETRIC GYNECOLOGIC & NEONATAL NURSING 103, 105 (2010).

107. Maureen L. Cropper et al., *The Determinants of Pesticide Regulation: A Statistical Analysis of EPA Decision Making*, 100 J. POL. ECON. 175, 181 (1992).

108. Gilden, *supra* note 106, at 105; *see also* Geneviève van Maele-Fabry et al., *Childhood Leukaemia and Parental Occupational Exposure to Pesticides: A Systematic Review and Meta-Analysis*, 21 CANCER CAUSES & CONTROL 787, 803 (2010).

109. Cropper, *supra* note 107, at 181.

110. Brenda Eskenazi et al., *Organophosphate Pesticide Exposure and Neurodevelopment in Young Mexican-American Children*, 115 ENVTL. HEALTH PERSPS. 792 (2007).

111. *See* Maryse F. Bouchard et al., *Prenatal Exposure to Organophosphate Pesticides and IQ in 7-Year-Old Children*, 119 ENVTL. HEALTH PERSPS. 1189 (2011).

112. *See* 7 U.S.C. §§ 136–136y (2012).

Standard¹¹³ and through its registration and re-registration processes.¹¹⁴ The EPA uses the registration process to determine whether a pesticide is sufficiently safe to be placed on the market.

In order for a pesticide to be distributed or sold, it must first be registered.¹¹⁵ The EPA will approve an application for registration of a pesticide if (1) its composition warrants the proposed claims, (2) its labeling and other submitted materials comply with FIFRA, (3) it will perform its intended function without unreasonable adverse effects on the environment, and (4) it will not generally cause unreasonable adverse effects when used in accordance with widespread and generally recognized practice.¹¹⁶ Each registration is limited to specific uses and lasts for a period of fifteen years, subject to re-review by the EPA.¹¹⁷ Practically speaking, this means that in order for an applicant to fulfill the aforementioned requirements, he must submit information such as the chemical formula, a request that the pesticide be classified for general use or for restricted use, the proposed labeling, and, if requested, either test result descriptions concerning the effects of the pesticide or a citation to test result data in the public literature.¹¹⁸

The term “unreasonable adverse effects on the environment” is central to the registrant’s application success. “Unreasonable adverse effects,” as statutorily defined, means any “unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide.”¹¹⁹ The term “environment” refers broadly to “water, air, land, and all plants and man and other animals living therein, and the interrelationships which exist among these.”¹²⁰ According to subsequent judicial interpretations of FIFRA, the unreasonable adverse effects determination must be made by reference to both a pesticide’s costs *and* benefits. According to the EPA’s website, the Agency has interpreted this broad statutory language to mean that any significant benefits to public health through disease control or prevention, or through vector control, need to be considered in a proposed action to cancel, suspend, or modify the use of a pesticide.¹²¹ But FIFRA, by its plain statutory language, also instructs that the EPA consider the *economic impact* of the proposed action (such as the

113. The Worker Protection Standard is a set of regulations that directs employers to take certain steps to reduce the risk of pesticide poisonings and injuries. *See* 40 C.F.R. §§ 170.1–260 (2014). This Part will explain the EPA’s regulation of pesticides through the registration process specifically.

114. Flocks, *supra* note 49, at 265–66.

115. 7 U.S.C. § 136(a).

116. *Id.* § 136a(c)(5)(D).

117. *Id.* § 136a(g)(1)(A)(iv).

118. *Id.* § 136a(c)(1)(F).

119. *Id.* § 136(bb).

120. *Id.* § 136(j).

121. *Explanation of Statutory Framework for Risk-Benefit Balancing for Public Health Pesticides*, EPA (May 9, 2012), <http://epa.gov/pesticides/health/risk-benefit.htm>.

suspension or cancellation of a pesticide) on the production and prices of agricultural commodities and retail food prices, among other impacts on the agricultural economy.¹²² This means that in considering whether to register, suspend, or cancel a pesticide, the EPA must perform a cost-benefit analysis that weighs the unreasonable adverse effects of the pesticide to humans or the environment against the beneficial commercial use of the pesticide in question.

If the EPA determines a pesticide imposes unreasonable adverse effects on the environment, the EPA may cancel or suspend the pesticide's registration.¹²³ The EPA must review relevant data internally and in consultation with other entities,¹²⁴ provide manufacturers with notice and opportunities to object or correct data deficiencies,¹²⁵ open up periods for public comment,¹²⁶ and stage administrative hearings if manufacturers protest the agency's actions.¹²⁷ Such proceedings typically take several years to complete.¹²⁸

A. *What Are a Pesticide's "Costs"?*

To delineate a pesticide's costs, the EPA requires a full battery of toxicological and epidemiological tests to prove that the pesticide does not cause unreasonable adverse effects on the environment. First, the EPA's Pesticide Assessment Guidelines contain the standards for conducting acceptable tests, guidance on evaluation and reporting of data, definitions of terms, and examples of acceptable protocols.¹²⁹ As to the tests themselves, the EPA requires that the applicant identify the use patterns of the pesticide.¹³⁰ Examples of use patterns include applications related to terrestrial, aquatic, greenhouse, forestry, and domestic outdoor and indoor usage.¹³¹

The most controversial data requirements are those required by the toxicity and reentry exposure categories. For testing purposes, toxicology studies are carried out on the plants and animals that "broadly represent non-

122. See 7 U.S.C. § 136(bb).

123. *Id.* § 136d(c)(1).

124. See *id.* § 136d(b) (specifying that the cost-benefit analysis must be submitted to the Department of Agriculture for comment). The economic analysis referral to the Department of Agriculture is also typically supplemented by a separate referral to a Scientific Advisory Panel (SAP) for review and comment. See *id.* § 136(d).

125. See *id.* § 136a(c)(6) ("Whenever the Administrator refuses to register a pesticide, the Administrator shall notify the applicant of the Administrator's decision and of the Administrator's reasons (including the factual basis) therefor.").

126. *Id.* §§ 136a(4), 136(10)(A).

127. *Id.* § 136d(d).

128. Lolley, *supra* note 19, at 991.

129. See 40 C.F.R. § 158.108 (2014).

130. See *id.* § 158.100.

131. See *id.*

target organisms.”¹³² Prominent among these impacts is the potential carcinogenic effect of exposure; both to the farmworkers who mix and apply the pesticides and to the consumers who ingest pesticide residues on food. Toxicology studies on wildlife and aquatic organisms are, for the most part, “crude inquiries into acute toxicity,” the results of which are extrapolated to help the EPA investigate long-term effects.¹³³

The categories of data on reentry exposure and spray drift have enormous bearing on farmworker occupational welfare. The EPA examines data on foliar and soil dissipation, as well as on dermal and inhalation exposures, to determine how soon farmworkers can reenter fields after the field has been sprayed.¹³⁴ Economic convenience for businesses is a competing priority here and must be weighed against the danger of pesticide absorption to farmworkers. In evaluating this data, the EPA may also consider the “voluntary” nature of the exposure, make assumptions about the effectiveness of protective gear, and even weigh the value of human life itself.¹³⁵

Multiple factors work to undercut the accuracy of the cost-apprehension process. First, the EPA reads FIFRA to create a presumption of efficacy, allowing the EPA to waive data requirements.¹³⁶ For example, the EPA does not periodically review the efficacy of pesticides, although it is required to by the statute.¹³⁷ Given the sheer quantity of data required,¹³⁸ the registration process is difficult to complete with any finality. The process is more accurately characterized as a give-and-take between the EPA and the applicant: the applicant submits progressively more information and agrees to more labeling and restrictions on use until the EPA is satisfied.¹³⁹ Thus, application

132. JEFF MILLER, CTR FOR BIOLOGICAL DIVERSITY, POISONING OUR IMPERILED WILDLIFE: SAN FRANCISCO BAY AREA ENDANGERED SPECIES AT RISK FROM PESTICIDES 32 (Feb. 2006), <http://www.biologicaldiversity.org/publications/papers/bayareapesticidesreport.pdf>.

133. WILLIAM H. RODGERS JR., 3 RODGERS' ENVTL. L. § 5.10(C) (2013).

134. *Id.*

135. *Id.* For example, safety standards imposed by regulatory authorities are often premised on the likelihood of adverse health effects to the civilian population. *See also* Valuation of Human Life in Regulatory Decisionmaking, 53 Fed. Reg. 13,299 (Apr. 22, 1988); ROBERT F. WASSERSTROM & RICHARD WILES, WORLD RES. INST., FIELD DUTY: U.S. FARMWORKERS AND PESTICIDE SAFETY 21 (1985) (“Likewise, in California, authorities will register compounds that meet the one-in-a-million standard among consumers [one additional case of cancer in the lifetime of 1,000,000 persons], one-in-300,000 among fieldworkers and one-in-100,000 among mixers, loaders, applicators, and flaggers—except in cases of ‘critical need,’ when ‘a risk as great as one in 10,000 may be tolerated for five years.’”).

136. *See* Registration Requirements for Antimicrobial Pesticide Products and Other Pesticide Regulatory Changes, 64 Fed. Reg. 50,672, 50,675 (proposed Sept. 17, 1999) (to be codified at 40 C.F.R. pts. 152 & 156). Efficacy studies are required for registration of pesticide products, but the EPA does not routinely review this data for most insecticides, fungicides, and herbicides. *Id.*

137. *See* 7 U.S.C. § 136a(g)(1)(A)(i) (2012) (“The registrations of pesticides are to be periodically reviewed.”).

138. *See* 40 C.F.R. § 158.150–.740 (2014) (obliging applicants to produce information across a wide range of categories, such as product chemistry, environmental toxicity, and mammalian toxicity).

139. *See* RODGERS, *supra* note 133.

denials for insufficient data, which are common, are widely understood to be invitations to continue the discussion.¹⁴⁰

Even after completion, registrants are required to continue to submit data on the adverse effects of the pesticide if registrants find themselves in possession of new information about the existence of such adverse effects,¹⁴¹ but the frequency with which pesticide users take this initiative is suspect, since it is the registrant that ultimately decides whether to report information to the EPA.¹⁴² All too easily, registrants may lie, withhold, or omit information in the hopes that the EPA will not learn of the information through other means.¹⁴³ A recent report by the NRDC, and subsequent investigation by the GAO, found that the EPA had no system to track whether companies ever submit the data and studies the agency requires for full registration.¹⁴⁴ These shortcomings underscore the inadequacy of the EPA's comprehension of the full risks posed by any particular pesticide to the health of workers and the environment.

B. What Are a Pesticide's "Benefits"?

After contemplating the risks imposed by a pesticide, the EPA must balance them against the benefits of using that pesticide. The EPA's benefits evaluation starts with a biological analysis that considers the effects of the pesticide on the target crop.¹⁴⁵ Thus, as its first step, the EPA must identify the pesticide's use (be it agricultural, industrial, commercial, or residential settings), as well as the principal pest populations that the pesticide is intended to control.¹⁴⁶

Next, the EPA determines the pesticide's importance to the continued production of the crop. This step of the analysis involves assessing the pest populations, the effectiveness of chemical and non-chemical alternatives, the geographic distribution of the pest problem, potential crop yield impacts, and alternative use practices that might mitigate the risk.¹⁴⁷ Thus, according to one former official, the EPA will ask: "How critical is [the pesticide]? Is there resistance to alternatives? Are the alternatives significantly more expensive?"¹⁴⁸ The EPA draws data from a variety of sources, including

140. *Id.*

141. 7 U.S.C. § 136d(a) (imposing on registrants a duty to disclose "factual information regarding unreasonable adverse effects on the environment" of the registered pesticide).

142. Amanda L. Kosowsky, Note, *Clarifying FIFRA Section 6(A)(2): The Post-Registration Reporting Obligations of Pesticide Registrants*, 4 ENVTL. LAW. 641, 662 (1998).

143. *Id.*

144. SASS & WU, *supra* note 5, at 2; U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-13-145, *supra* note 24, at 2.

145. *Risk/Benefit Balancing Under FIFRA*, CORNELL PESTICIDE SAFETY EDUC. PROGRAM (2012), <http://psep.cce.cornell.edu/issues/risk-benefit-fifra.aspx>.

146. *Id.*

147. *Id.*

148. Puneet Kollipara, EPA Plan on AZM Phaseout Could Set Novel Pesticide Risk-Benefit Formula (July 23, 2012) (unpublished manuscript) (on file with author) (quoting anonymous source).

scientific literature, the EPA's own databases, communications with both pesticide users and other government agencies, academics, and various stakeholder organizations.¹⁴⁹

The EPA must then convert the information on yield loss and reduced crop quality gathered in the first phase of its analysis into economic terms.¹⁵⁰ The paramount inquiry here is whether it will cost more to produce the crop if the pesticide was unavailable on the market.¹⁵¹ In answering this question, the EPA looks to the cost-effectiveness of alternative pest control strategies.¹⁵² Some pesticides have effective and readily available substitutes, in which case the economic impact of withdrawing the pesticide may be small.¹⁵³ In such cases, the benefits of the pesticide would be considered minimal, and the EPA is more likely to cancel or suspend the pesticide if its effects have been shown to be unreasonably adverse.¹⁵⁴

However, if equally effective alternatives do not exist, the EPA must then quantify the higher costs of production borne by pesticide users with regard to both agricultural and non-agricultural food products and services.¹⁵⁵ These higher costs are those that would result from the alteration of the users' production practices in the case of the pesticide's unavailability. The EPA may model the effects that these higher production costs have on consumer prices in making these calculations.¹⁵⁶

Lastly, the EPA considers agricultural subsidies, quotas, or allotments; supply and demand factors; and international trade issues in its evaluation of the pesticide's economic impact.¹⁵⁷ These impacts may be evaluated on both a regional and national scale.¹⁵⁸ If the negative economic impacts are considered sufficiently substantial,¹⁵⁹ the EPA may modify its actions (or be instructed to modify its actions by a reviewing court) accordingly.

Beyond the general guidelines outlined above, the EPA lacks a formal procedure for weighing benefits against risks to farmworkers and consumers that are exposed to the pesticide.¹⁶⁰ For example, the EPA does not have methods for evaluating how much additional worker risk is acceptable for every unit increase in grower revenue or how much additional general

149. *Risk/Benefit Balancing Under FIFRA*, *supra* note 145.

150. *Id.*

151. *Id.*

152. *Id.*

153. *Id.*

154. *Id.*

155. *Id.*

156. *Id.*

157. *Id.*

158. *Id.*; *see also* *Love v. Thomas*, 858 F.2d 1347, 1361–62 (9th Cir. 1988) (evaluating a proposed cancellation's effect on the Northwest blueberry industry).

159. *Risk/Benefit Balancing Under FIFRA*, *supra* note 145.

160. Kollipara, *supra* note 148 (former EPA official commenting as much).

population risk is acceptable under the cost-benefit analysis.¹⁶¹ Even if the EPA established such procedures, it is troubling that the analysis deliberately weighs the lives and health of a powerless racial minority against economic costs to the farming industry. As it is, the technical jargon and complex numerical calculations that underpin cost-benefit analysis too easily conceal partisan motives and allow for informal judgment calls under the guise of the purportedly “neutral” venture of evaluating costs and benefits. The controversy over the pesticide AZM illustrates the problems inherent in this informal procedure.

III.

THE AZM RE-REGISTRATION CONTROVERSY

The recent litigation over AZM illustrates the problems that arise in the application of cost-benefit analysis in the pesticides context. Despite AZM’s demonstrated sizeable health risks to workers and the environment, the EPA found that an immediate cancellation of the pesticide was not justified, given the potential impact that removal of the pesticide from the market might have on growers’ production procedures and business profits.

Before its usage was finally banned in 2012, AZM, a category of organophosphate insecticide, “[was] among the registered pesticides responsible for the largest number of reported farmworker poisonings” in the United States.¹⁶² When it was registered, the EPA accorded AZM its highest toxicity ranking.¹⁶³ The pesticide, which has poisoned thousands of workers, was only phased out after protracted litigation over the EPA’s controversial decision to re-register the pesticide in 2006. The litigation ended in 2010, with the courts upholding the EPA’s 2006 determination that a phase-out period of six years was the most appropriate method to remove AZM from the market.¹⁶⁴

AZM is a neurotoxin derived from nerve agents¹⁶⁵ developed during World War II.¹⁶⁶ The pesticide’s primary use is to kill insects on orchard crops such as apples, cherries, pears, peaches, and nectarines.¹⁶⁷ The highest usage occurs in Washington, Oregon, California, Michigan, Georgia, New York, New

161. *Id.*

162. Opening Brief for Plaintiff-Appellants at 8, *United Farm Workers v. EPA*, 592 F.3d 1080 (9th Cir. 2008) (No. 08-35528).

163. *Id.*

164. *See United Farm Workers of Am., AFL-CIO v. EPA*, 592 F.3d 1080 (9th Cir. 2010).

165. Nerve agents, also known as organophosphates, are a category of toxic chemicals that attack the nervous system and cause muscle spasms and respiratory problems. *See Nerve Agents Guide*, OCCUPATIONAL SAFETY & HEALTH ADMIN., U.S. DEP’T OF LABOR, <https://www.osha.gov/SLTC/emergencypreparedness/guides/nerve.html>.

166. Opening Brief for Plaintiff-Appellants, *supra* note 162, at 6.

167. *EPA Puts Deadline on Pesticide That Poisons Farmworkers*, EARTHJUSTICE (Nov. 16, 2006), <http://earthjustice.org/news/press/2006/epa-puts-deadline-on-pesticide-that-poisons-farmworkers>.

Jersey, and Pennsylvania.¹⁶⁸ AZM can cause muscle spasms, vomiting, loss of consciousness, seizures, paralysis, permanent nerve damage, loss of intellectual functions, and death.¹⁶⁹ Scientists also suspect linkages of AZM to “asthma, hormone disruption, low birth weight, and in utero developmental brain impairments.”¹⁷⁰ Because of the described adverse effects, AZM has been banned in the European Union since 2006.¹⁷¹

First registered in 1959, the EPA re-registered ten uses of AZM in 2001.¹⁷² Despite the results of an agency investigation that concluded that the pesticide posed unacceptable risks to farmworkers and the environment, the EPA’s Interim Re-Registration Decision (IRED) instructed that thirty-five uses of AZM should be either immediately canceled or phased out over a four-year period, but that ten uses of AZM should be retained.¹⁷³ The remaining ten uses were eligible for re-registration, pending the EPA’s review of data.¹⁷⁴

Farmworker exposure to AZM is well documented. AZM has been detected at potentially harmful levels in the schools and homes of farmworkers and their children. One study found AZM residues in the dust of 85 percent of sampled farmworkers’ homes and in 87 percent of sampled workers’ vehicles in eastern Washington in 2002.¹⁷⁵ Another study found that, of farmworkers’ children surveyed whose parents worked in agriculture, 56 percent of doses administered in the spray season exceeded the EPA’s acceptable level of long-term exposure. The same study revealed that 35 percent of the children surveyed had absorbed AZM doses that exceeded the EPA’s safe level for a single-day exposure.¹⁷⁶

In 2004, fearing for the health of their constituency, several farmworker advocacy groups filed suit in district court under FIFRA challenging the EPA’s AZM IRED.¹⁷⁷ After two years of litigation, the farmworkers and the EPA entered into a settlement agreement under which the EPA was required to reevaluate its stance on AZM.¹⁷⁸

168. *Id.*

169. IRED 2001, *supra* note 16, at 26.

170. Opening Brief for Plaintiff-Appellants, *supra* note 162, at 2.

171. Alex Scott, *Europe Rejects Appeal for Use of Azinphos-methyl Pesticide*, IHS CHEMICAL WEEK (Aug. 4, 2008, 9:42 AM), <http://www.chemweek.com/envirotech/regulatory/13435.html>.

172. IRED 2001, *supra* note 16, at 6 (stating that, under the 2001 IRED, the EPA specified ten time-limited AZM uses that were eligible for re-registration for a period of four years).

173. *Id.* These remaining ten uses include the application of AZM to almonds, apples/crabapples, highbush and lowbush blueberries, brussels sprouts, cherries, nursery stock, parsley, pears, pistachios, and walnuts. *Id.*

174. *Id.*

175. Cynthia L. Curl et al., *Evaluation of Take-Home Organophosphorus Pesticide Exposure Among Agricultural Workers and Their Children*, 110 ENVTL. HEALTH PERSPS. 787, 789 (2002).

176. Richard A. Fenske et al., *Biologically Based Pesticide Dose Estimates for Children in an Agricultural Community*, 108 ENVTL. HEALTH PERSPS. 515 (2000).

177. *United Farmworkers of Am. v. EPA*, No. C04-099RSM, 2008 WL 2117114, at *2 (W.D. Wash. May 19, 2008).

178. *Id.*

In November 2006, after receiving comments from workers' groups, environmental organizations, and industry stakeholders, the EPA issued a final decision.¹⁷⁹ The EPA decided to use the FIFRA-mandated cost-benefit analysis to extend the phase-out period of the pesticide to six years instead of the original four.¹⁸⁰ Farmworker groups subsequently amended their complaint in federal court, arguing that the re-registration was arbitrary, capricious, and contrary to law.¹⁸¹ However, the suit was thrown out on procedural grounds by the district court.¹⁸² The farmworkers appealed, but the Ninth Circuit affirmed the district court opinion.¹⁸³ Since the courts declined to intervene, the EPA's decision to phase-out AZM over six years remained largely intact. The decision essentially condoned the exposure of farmworkers to unacceptable risks of poisonings for the remaining period of the phase-out.¹⁸⁴

A. *The EPA's Final Decision Delineates the Problems Inherent to Cost-Benefit Analysis*

The EPA's final decision on the AZM re-registration controversy¹⁸⁵ illustrates the limitations of cost-benefit analysis. The EPA began its final report on the cost-benefit analysis with a summary of AZM's risks. The agency concluded that the pesticide was "very highly toxic" to fish, invertebrates, birds, mammals, and beneficial insects.¹⁸⁶ Continued usage of AZM in certain circumstances would exceed known toxicity levels for these categories of organisms, with adverse effects on organism mortality and reproductive health.¹⁸⁷ This conclusion was supported by ample EPA records of ecological kill incidents,¹⁸⁸ as well as an EPA study documenting adverse effects on an endangered salmon species in the American Northwest.¹⁸⁹ At the same time, the EPA was not particularly concerned about AZM's risks to workers. The EPA observed that even after factoring in all possible mitigation measures, safety margins (margins of exposure, or MOEs)¹⁹⁰ fell far below the appropriate safety threshold for pesticide mixers, loaders, and applicators.¹⁹¹

179. *Id.*

180. *Id.*

181. *Id.* at *3.

182. *Id.* at *1.

183. *United Farm Workers of Am. v. EPA*, 592 F.3d 1080 (9th Cir. 2010).

184. *See id.* at 1084 (Pregerson, J., dissenting).

185. EPA, OFFICE OF PREVENTION, PESTICIDES & TOXIC SUBSTANCES, FINAL DECISIONS FOR AZINPHOS-METHYL (Nov. 16, 2006) [hereinafter FINAL DECISIONS], http://www.epa.gov/pesticides/reregistration/azm/azm_remaining_uses.pdf.

186. *Id.* at 4.

187. *Id.*

188. Kill incidents are incidents of die-off in animal or fish populations. *See* GLENN W. SUTER II, ECOLOGICAL RISK ASSESSMENT 362 (1st ed. 1993) (discussing insect and bird kill incidents in relation to field tests).

189. *Id.* at 4-5.

190. An MOE is the ratio of the maximum level that causes no effects in animals to the human exposure. An MOE of ten means that the maximum safe level in animals is ten times the human

AZM applicers were consistently exposed to levels of high MOE. For some workers who handled AZM directly, MOEs were as low as ten, while the MOEs for other reentry workers hovered at around thirty.¹⁹² Such high exposures to AZM, the EPA observed, could subject workers to adverse neurological effects.¹⁹³ Mitigation measures that could be taken to diminish worker MOE to the acceptable level of one hundred were considered too impractical to implement.¹⁹⁴ For example, farmworkers could hardly be told to wait fourteen days before reentering the treatment site, given the importance of performing crop-maintenance activities at the critical juncture of the crop's growth cycle.¹⁹⁵ And imposing greater protective gear, another idea that the EPA considered and rejected, would only increase workers' vulnerability to heat stress.¹⁹⁶

Nevertheless, the EPA determined that AZM's risks were not sufficient to warrant immediate cancellation of the pesticide.¹⁹⁷ The EPA's assessment of AZM's benefits demonstrates that even the unsettling, well-substantiated risks to human and animal health catalogued above may not be enough to overcome a showing that the pesticide is important to the profit margins of crop growers.

This is especially evident in the EPA's analysis of AZM's usage in apple farming. While it was still allowed on the market, AZM was particularly important for apple production. AZM use on apples accounted for 76 percent of the total current use of AZM in 2006, and 73 percent of the apple crop overall was treated with AZM.¹⁹⁸ In its final decision, the EPA estimated the aggregate losses to growers in various regions of the country in the event that AZM was immediately removed from the market. Figures ranged from \$9 million to \$31 million in the eastern United States, and from \$9 million to \$50 million in the western United States.¹⁹⁹ Total national impacts were estimated at a not inconsiderable 5 to 18 percent of current net revenues.²⁰⁰ Additionally, the EPA predicted that exports of apples could be adversely impacted as well: a

exposure being measured, or that the human exposure is one-tenth of the maximum safe level in animals. The MOE is thus based on the inverse of the human exposure. A larger MOE means a lower, and safer, exposure. ACKERMAN, *supra* note 86, at 117. An MOE of one hundred means that humans should be exposed to 1 percent or less of the maximum-no-effects level in animal studies. *Id.*

191. FINAL DECISIONS, *supra* note 185, at 6.

192. *Id.*

193. *Id.* at 13 ("The worker risk assessment indicates that existing MOEs at current label rates are insufficient to ensure that there is not a concern that workers will be exposed to levels of AZM that will result in cholinesterase depression—a precursor of adverse neurological effects.").

194. *Id.* at 21.

195. *Id.*

196. *Id.*

197. *Id.* at 2–3.

198. *Id.* at 11.

199. *Id.* at 12.

200. *Id.*

“worst-case” estimate projected losses to the apple industry of well over \$100 million.²⁰¹

The EPA provided four main rationales for its conclusion that the benefits of AZM outweighed its risks. First, although many effective alternatives to AZM exist, the pesticide residues of these alternatives are forbidden in other countries to which U.S. apples are exported. Canceling AZM would have left U.S. growers at a risk of losing the export market to competitors. This theory was based on the idea that the adoption of alternative pesticides in the United States might deter exports of U.S. food products if other countries had not established maximum residue levels (MRL) for those alternatives. Potential costs might run over \$100 million.²⁰²

Second, development of effective alternative pest control practices typically takes multiple use seasons to perfect.²⁰³ Growers who were forced to switch to alternatives without the necessary experience or guidance to help them along could incur losses that exceeded the EPA’s estimates.²⁰⁴

Third, and more controversially, the EPA observed that though AZM risks were significant, the EPA had not recorded any immediate large-scale environmental impacts or severe worker poisoning incidents. If such impacts or poisonings were occurring on a large-scale basis, incident and monitoring databases—even as under-maintained as those are—should reflect it, the EPA reasoned.²⁰⁵

Fourth, and finally, the EPA determined that its proposed risk mitigation measures would minimize risks “to some extent” during the phase-out period.²⁰⁶

The EPA premised its decision to lengthen the phase-out period from four to six years for blueberries, pears, cherries, and almonds on similar reasoning. Counterintuitively, in the case of cherries, the EPA reiterated its commitment to the six-year phase-out even in the absence of high economic impact and even though MRLs for alternative pesticides were in place for numerous export markets.²⁰⁷ The Agency noted only that the economic impact of AZM’s removal, though less than in the apple and pear markets, was “still significant,” and that the absence of certain MRLs in certain important export markets could still have an impact on growers selling to those markets.²⁰⁸

The EPA’s analysis of almonds presents perhaps the most outrageous case of cost-benefit miscalculation. The EPA conceded that AZM use on almonds

201. *Id.* at 13.

202. *Id.*

203. *Id.*

204. *Id.*

205. *Id.*

206. *Id.* at 13–14. Notably absent from this rationale was the assertion that the risks would be reduced to below an appropriate level. That, of course, the EPA could not claim.

207. *Id.* at 23.

208. *Id.*

“presents significant worker and ecological risks,” and that AZM’s benefits for almonds were “quite limited.”²⁰⁹ Nevertheless, public comments and meetings with grower groups had alerted the Agency to the importance of AZM to some growers in preventing the spread of a certain type of fungus.²¹⁰ Although the threat of the fungus was not widespread, the EPA concluded that affected growers would need additional time to develop alternative strategies to address that concern.²¹¹ The EPA did not discuss the types of controls that were already available to control the fungus. Instead, the Agency simply concluded that although a six-year phase-out was unwarranted, growers would be allowed an additional two years to switch pesticide usages—even in the face of “significant” worker and ecological risks and “limited” benefits to growers.²¹²

The greatest takeaway from the EPA’s final decision is that the EPA places inordinate importance on preserving the economic benefits of AZM usage to growers. In fact, the EPA reasoned that the balance of the cost-benefit analysis would only tip in favor of cancellation if a number of export countries had adopted MRLs for AZM substitute pesticides and if growers had grown efficient at implementing alternative regimes of pest control.²¹³ Swayed by grower and registration comments, the EPA concluded that “six years was likely a more accurate estimate for the time period in which a number of proven, cost-effective alternatives for which MRLs have been established will become available to growers.”²¹⁴

Even assuming that the EPA should use its cost-benefit analysis when the stakes involve the infliction of severe and irrevocable harms on farmworkers and their children, the EPA should have found that the costs of AZM outweighed its benefits. In recent cost-benefit analyses conducted in other contexts the value attributed to avoided deaths has amounted to several million dollars per death.²¹⁵ Under this standard, a few dozen avoided deaths would offset the entire estimated benefit of AZM to apple and pear growers. In the application of AZM to almond harvests, the outcome should have been even clearer: the significant risks posed by AZM, combined with its limited economic importance to growers, should have warranted the immediate cancellation of the pesticide, despite the potential danger of the single fungus that AZM was purportedly so instrumental in controlling. The EPA’s re-registration of the pesticide in all of the preceding instances should serve to underscore the urgent shortcomings of cost-benefit analysis.

209. *Id.* at 27.

210. *Id.*

211. *Id.*

212. *Id.*

213. *Id.* at 14.

214. *Id.*

215. ACKERMAN, *supra* note 86, at 6 (explaining that a common estimate in cost-benefit analyses of the late 1990s was that an avoided death amounted to roughly \$6.3 million).

B. Grower Benefits from AZM Usage Were Likely Overestimated

The EPA very likely overestimated the benefits of AZM to users of the pesticide. First, the EPA's own estimates of the economic impact of cancellation varied dramatically from year to year. In its 2001 analysis, the EPA estimated that removing AZM and another pesticide, phosmet, from the market would reduce apple grower revenues by at least \$114 million annually, and pear grower revenues by at least \$100 million.²¹⁶ In the 2006 analysis, which estimated revenues under the assumption that growers had access to various substitute pesticides in place of AZM, this estimate declined to at least \$18 million for apples and at least \$1 million for pears.²¹⁷ Put starkly, 84 percent of the benefits of AZM and phosmet for apple growers and 99 percent of the benefits for pear growers had simply vanished between 2001 and 2006.²¹⁸

In 2012, the EPA once again reduced its estimate of the economic impact of AZM's removal in a revised analysis. The analysis found that growers of most of the relevant crops would face less economic costs than the original analysis predicted.²¹⁹ The EPA's own uncertainty about the extent of the economic impact subverts the legitimacy of its entire cost-benefit analysis and casts serious doubt on the wisdom of allowing workers to suffer injurious levels of exposure when the EPA cannot even quantify the benefits of a pesticide with any degree of certainty.

The EPA also underestimated the value of alternative pesticide control schemes in its final decision. The agency failed to consider the full range of alternatives, including biological controls, alternative chemicals, integrated pest management, and organic approaches. For example, the EPA either overlooked or minimized the benefits of alternative technologies such as pheromone mating disruption and the protection of fruit with kaolin clay, a nontoxic film that repels pests.²²⁰ Both techniques had been shown to control pests with either no or moderate increases in costs.²²¹ The EPA's analysis concerned itself

216. *Id.* at 123.

217. *Id.*

218. *Id.*

219. Kollipara, *supra* note 148.

220. ACKERMAN, *supra* note 86, at 117.

221. *Id.* For example, the California Department of Pesticide Regulation (CDPR) conducted a study that found that pheromones could adequately control moths in pear orchards and enable growers to avoid organophosphate applications during the growing season. See RACHEL ELKINS, CAL. DEP'T OF PESTICIDE REGULATION, PEST MANAGEMENT GRANTS FINAL REPORT, CONTRACT NO. 98-0265: AREAWIDE IMPLEMENTATION OF MATING DISRUPTION IN PEARS USING PUFFERS (2000). Another study in California, Oregon, and Washington found that large-scale mating disruption through introducing sterile moths or placing dispensers of synthetic pheromones throughout an orchard is effective. Mating disruption was initially more expensive, but over time it became more cost-effective owing to its effects on secondary pests. See C.O. Calkins, *Review of the Codling Moth Areawide Suppression Program in the Western United States*, 15 J. AGRIC. ENTOMOLOGY 327 (1998).

only with pesticide alternatives when it should have considered the viability of other pesticide-control substitutes.

The third reason undergirding the EPA's decision to retain the usage of AZM—that the agency had not detected any extensive environmental impacts or severe worker poisoning incidents—is especially problematic. The EPA essentially asserted that it would only take action against a pesticide's registration status if the situation reached a crisis point. Furthermore, exposed workers, animals, and the environment would have to bear sufficient, demonstrable harm.²²²

But what amount of harm is sufficient to trigger cancellation of a pesticide? Must five hundred workers sicken, or five thousand? Who makes the call? What values, motivations, or ideologies will guide them? The difficulties involved in calculating an answer to these questions are a strong indication that policy makers should use the precautionary paradigm to guide their regulatory efforts. The point of pesticide regulation is to prevent harm before it occurs, not to respond once exposure has created a mass epidemic. Once the EPA confirms that a potent toxin causes serious harm to workers and animals alike, policymakers must take a precautionary approach to its regulation.

Precaution is necessary for three additional reasons. First, the EPA lacks a surveillance system to track pesticide poisoning incidences.²²³ Second, workers who fear for the security of their jobs are extremely reluctant to report, sue, or otherwise publicize their illnesses.²²⁴ Finally, many pesticide-caused diseases are difficult to trace to any particular pesticide, or do not even manifest until much later in the worker's life cycle.²²⁵ In sum, a pesticide's harms may be difficult to detect, but that does not mean that they are not occurring. To assume otherwise ignores substantial evidence.

*C. Mitigation Measures Proposed by the EPA May Be Inadequate,
Contributing to an Underestimation of Farmworker Risk*

The EPA's confidence that the risk mitigation measures will be effective to some unascertained but significant extent is unwarranted in light of the general unevenness with which mitigation measures are actually implemented by growers. The EPA's mitigation measures for AZM in apple orchards involved amending product labels to reflect the reduction of the seasonal maximum of AZM usage by about half a pound per active ingredient per acre per year, prohibiting the aerial application of AZM, and increasing buffer zones

222. FINAL DECISIONS, *supra* note 185, at 13.

223. *Pesticide Safety*, *supra* note 37.

224. Greene, *supra* note 41.

225. Huber, *supra* note 45.

for homes and bodies of water.²²⁶ Similar mitigation tactics for uses of the pesticide were instituted for pears, blueberries, and cherries.²²⁷

Assuming that these proposed measures are effective greatly obscures the extent of the health risks suffered by workers. First, the EPA's final decision is notable for what it does *not* claim about the extent to which the EPA's proposed mitigation measures will reduce worker risk. The decision is silent on how implementing an incremental reduction regime will reduce worker risk and by how much.²²⁸ The decision also offers little insight on whether the reduction in risk will be significant enough to bring worker exposure levels to within acceptable safety margins (that is, an MOE of at least one hundred). Given these omissions, it is hard to avoid the conclusion that the phase-out would continue to expose workers to intolerably high risks of poisonings. The EPA's assurance that worker risk would be reduced "to some extent"²²⁹ is cold comfort for those workers who nevertheless must bear the brunt of the exposure.

Second, amending product labels, by itself, is not a panacea to the problem of mitigating exposure risk. Specifying maximum application levels on labels would, presumably, lead to a decrease in the amount of AZM yearly applied in apple or pear orchards. But commentators have long criticized FIFRA's labeling and use requirements as ineffectual.²³⁰ In theory, correct usage and application of a pesticide, per labeling instructions, should shield workers from significant adverse exposure. There is ample reason to suspect, however, that such correct usage and application often does not occur and that the worker protection measures already in place are ineffectual. Many, if not most, farmworkers lack basic English proficiency,²³¹ such that they cannot read the labeling instructions. In addition, growers often provide inadequate trainings to educate workers about the correct usages of a pesticide or pesticide-related equipment, or fail to provide such trainings altogether.²³²

For example, despite the Worker Protection Standard's (WPS) training requirements, one EPA study found that employers often did not train their workers, because they were not "convinced of the need for pesticide health and safety training for their seasonal workers."²³³ These employers believed that pesticide safety was merely a matter of "common sense."²³⁴ Employers also

226. FINAL DECISIONS, *supra* note 185, at 15.

227. *Id.* at 7.

228. *Id.* at 13–14 (noting only that the proposed mitigation measures would reduce risk to "some extent").

229. *Id.* at 14.

230. *See, e.g.*, Flocks, *supra* note 49, at 267–68.

231. CARROLL ET AL., *supra* note 46, at 21–22.

232. Flocks, *supra* note 49, at 267.

233. ALICE C. LARSON, AN ASSESSMENT OF WORKER TRAINING UNDER THE WORKER PROTECTION STANDARD: FINAL REPORT 66 (June 2000).

234. *Id.*

expressed trepidation that providing training would increase their exposure to lawsuits and instill in their workers the “ungrounded” belief that every illness was pesticide-related.²³⁵

Additional factors indicate that mitigation measures may not prove especially effective in the pesticide safety context. The EPA lacks a system of standardized monitoring to track violations, is too understaffed to regularly inspect growers, and often fails to penalize violations altogether.²³⁶ Employers also frequently underreport violations. In addition, employers frequently neglect to post important safety information,²³⁷ such as reentry times, with the result that workers often reenter treated fields before it is safe to do so.²³⁸ Significantly, the EPA has acknowledged that even maximum compliance with the WPS has not protected a large percentage of pesticide handlers from pesticide-related sickness.²³⁹ A recent study surveying pesticide-poisoning instances among farmworkers between 1998 and 2005 concluded that in 30 percent of the cases of high levels of pesticide exposure, workers had followed all label requirements, including those involving reentry and the donning of personal protective equipment (PPE).²⁴⁰ That these workers still contracted pesticide-related illnesses highlights the inadequacy of existing safety measures.

The EPA’s projections are already significantly underestimating worker exposure.²⁴¹ Premising the AZM cost-benefit analysis on the idea that mitigation measures will shield workers from exposure is conjectural at best and a dangerous gamble at worst.

*D. Regulatory Capture Contributes to the Problem of Benefits
Overestimation and Leads to Further Distortions in Cost-Benefit
Analysis*

Any explanation of the overestimation of economic benefits to growers described in Section B must account for the phenomenon of regulatory capture—the multi-stage methods, occurring at different pressure points of the

235. *Id.* at 67–68.

236. *See* Cunningham-Parmeter, *supra* note 65, at 456.

237. *See, e.g.,* Kay Harris, *EPA Cites Five Colorado Growers for Failing to Comply with WPS*, 21 PESTICIDE UPDATE 1 (2003) (reporting that the EPA had penalized growers for failing to post emergency information and pesticide-specific application information in a central location).

238. *See* Cunningham-Parmeter, *supra* note 65, at 455–60.

239. OFFICE OF PESTICIDE PROGRAMS, EPA, PESTICIDE REGISTRATION (PR) NOTICE 2000-9, at 3 (Sept. 29, 2000), <http://www2.epa.gov/sites/production/files/2014-04/documents/pr2000-9.pdf> (“[E]ven with maximum feasible personal protective equipment (PPE) and engineering controls, including all provisions required by the Worker Protection Standard, risks to workers still exceed the Agency’s levels of concern.”).

240. Calvert et al., *supra* note 36, at 891–92.

241. PESTICIDE PROGRAM DIALOGUE COMM., *supra* note 27 (admitting that the EPA has no reliable idea of the number of pesticide poisoning incidences that occur a year).

regulatory process, by which the agricultural industry influences governmental bodies to issue favorable decisions and regulations.

Stories of industrial influence in regulatory decision making are legend. Deep-pocketed lobbying coalitions, the “revolving door” between high-power government and industry positions, campaign contributions to key candidates, growing corporate consolidation and concentration of economic resources among a few industry heavyweights, and the orchestration of scientific evidence by agribusiness-funded scientists are all methods by which industry exerts pressure on the regulatory bodies that police it.²⁴² A leading study analyzed empirical evidence to evaluate the importance of the agrochemical industry’s influence on EPA decision making. It found that industry has been able to influence regulatory decisions of the EPA.²⁴³ Generally, corporations pay former regulators exorbitant private-sector salaries for their knowledge of how to navigate the regulatory process most efficiently and, even more, for their agency contacts.

Recent events confirm that the industry’s influence has grown. In the United States, the agrochemical industry is among the largest spenders among federal lobbyists. For example, in 2009, the agrochemical giant Monsanto spent \$13.3 million to lobby the federal government, Dow Chemical spent \$11.8 million, the American Chemical Council spent \$11.5 million, and Bayer spent \$9.8 million.²⁴⁴

Likewise, there are numerous examples of industries securing presidential appointments to the highest levels of government. In March of 2010, President Barack Obama announced the recess appointment of Islam A. Siddiqui—previously a lobbyist for the pesticides trade association CropLife—as the Chief Agricultural Negotiator of the United States Trade Representative, despite objections by environmentalists.²⁴⁵ Similarly, the agrochemical industry has also directly lobbied the EPA. For example, in June 2010, the pesticides producer Syngenta hired a public affairs firm to lobby the EPA over the regulatory review of the pesticide Atrazine.²⁴⁶

242. See generally Christopher Marcoux & Johannes Urpelainen, *Special Interests, Regulatory Quality, and the Pesticides Overload*, 28 REV. POL’Y RES. 585 (2011).

243. Cropper et al., *supra* note 107, at 176.

244. Marcoux & Urpelainen, *supra* note 242, at 590.

245. *Id.*

246. *Id.* Even more troubling than the industry’s outsized effect on governmental bodies is the media documentation of the predatory, unethical actions undertaken by a leading pesticide manufacturer to defame a leading prominent scientist’s campaign against a lucrative herbicide, Atrazine. Hundreds of unsealed records showed that Syngenta had orchestrated a campaign to destroy the scientist’s reputation. See Rachel Aviv, *A Valuable Reputation*, NEW YORKER (Feb. 10, 2014), <http://www.newyorker.com/magazine/2014/02/10/a-valuable-reputation> (documenting how Syngenta’s public relations team planned a strategy to “exploit Hayes’ faults/problems” and quoting Syngenta’s communications manager, Sherry Ford, as writing down the goal of “prevent[ing] citing of TH data by revealing him as noncredible”).

Industry's skill in using backdoor channels of influence contributes to a profound informational imbalance. Agribusiness is much better represented and resourced than the farmworkers it employs. The associated informational asymmetry that arises from this imbalance all but ensures distortions in any cost-benefit analysis—even one conducted by a regulatory body that is trying its hardest to keep the interests of farmworkers in mind. Industry is deep-pocketed enough to employ a panoply of lawyers, lobbyists, experts, and scientists to argue on its behalf, while farmworkers have no such army to represent it in the courts of public opinion.

Additional compounding factors make it unsurprising that the AZM cancellation proceedings developed as they did. The EPA's staff is perpetually under-resourced,²⁴⁷ and pesticide regulation has hardly drawn the sort of public attention necessary to sway the EPA toward taking more, and not fewer, regulatory precautions. But, if the AZM example has demonstrated anything, it is that cost-benefit analysis is a fundamentally distorted process that fails to serve the interests of *all* stakeholders affected by a pesticide's implementation. What is needed to address all of these interests is a recasting of the principle that guides pesticide regulation. The following Part explores the applicability of the precautionary principle in this respect and argues that any regulatory efforts should derive lessons from that body of literature.

IV.

RECOMMENDATIONS

All remaining uses of AZM were phased out in 2012, but the re-registration of the pesticide stands as an example of the serious problems that attach to the EPA's cost-benefit analysis. Oftentimes, the benefits are subject to uncertainty and are impossible to value. The costs may be exaggerated or miscalculated. And the "bottom line" comparison of the two may, in practice, be an obscurely technical process that can easily conceal a partisan agenda.²⁴⁸

The fundamental distortions and inaccuracies inherent in the cost-benefit analysis signal the need for an alternative approach in regulating pesticides. As mentioned above, when so much is unknown about the health risks of pesticides, policy makers should adapt a precautionary approach to preventing potential harm. In short, the precautionary principle calls for taking action against threatened harm to individuals and ecosystems even in the absence of

247. See, e.g., Joel Mintz, *Cutting EPA's Enforcement Budget: What It Might Mean*, CTR. FOR PROGRESSIVE REFORM: CPR BLOG (Apr. 12, 2012), <http://www.progressivereform.org/CPRBlog.cfm?idBlog=A6A2E941-98B3-8007-9CEEB42458BED78E> (commenting on the EPA's proposed plan to cut back on specific areas of enforcement in response to looming budget cuts for the year of 2013); Sheila Kaplan, *EPA Staffers Were Forced to Ignore Science, Investigation Finds*, POLITICS DAILY (Apr. 29, 2010), <http://www.politicsdaily.com/2010/04/29/epa-probe-politics-shortages-affect-environmental-agencys-wor> (noting the EPA's lack of sufficient scientists in regional offices).

248. ACKERMAN, *supra* note 86, at xiv.

full scientific certainty.²⁴⁹ Action should not be delayed simply because full scientific information is lacking.²⁵⁰

To implement this principle is to recognize the limitations of scientific knowledge. Human society knows too little about the harms caused by proliferating modern technologies and industrial activity to allow such pesticide use to continue without closer scrutiny.²⁵¹ Extinctions of plant and animal species; devastation to ecosystems; the specter of global warming; and the unexplained rise of cancer, asthma, Alzheimer's disease, autism, birth defects, developmental disabilities, diabetes and other serious medical conditions among infants and young children are all problems associated with modernity and industrialization.²⁵² Waiting for scientists to conclusively prove that such ills are the direct result of the industrial activities to which they are linked leads to regulatory paralysis. This may ultimately facilitate harms that may have been averted with precautionary measures.

As some commentators have observed, the greatest weakness in most environmental and public health policies is that they are based on the expectation that science can and must provide definitive proof of harm before agencies can take protective action.²⁵³ The problems of relying on science alone to regulate health are already well-explored elsewhere: scientific standards of certainty may be impossible to attain when causes and outcomes are too numerous to monitor or study; latent periods often extend beyond the patience of the most well-funded scientists; timing of exposure is crucial; unexposed, control populations do not exist (especially if the populations with which studies are most concerned are human beings); and confounding factors may remain unidentified.²⁵⁴ In the absence of such scientific certainty, the precautionary principle advises that regulations be implemented to prevent harm to humans and the environment before it occurs—even in (or especially in) the face of uncertainty.²⁵⁵

249. See generally PRECAUTIONARY TOOLS FOR RESHAPING ENVIRONMENTAL POLICY 1 (Nancy J. Myers & Carolyn Raffensperger eds., 2006).

250. See *id.*

251. WORLD COMM'N ON ETHICS OF SCI. KNOWLEDGE & TECH. (COMEST), THE PRECAUTIONARY PRINCIPLE 7–8 (Mar. 2005) [hereinafter COMEST REPORT], <http://unesdoc.unesco.org/images/0013/001395/139578e.pdf>.

252. *Precautionary Principle – FAQs*, SCI. & ENVTL. HEALTH NETWORK [hereinafter SEHN FAQ], <http://www.sehn.org/ppfaqs.html> (last visited Jun. 15, 2015).

253. *Id.*

254. *Id.*

255. In recognition of the consequences that human enjoyment of the conveniences and comforts of modern society have wrought upon the health of individuals and the environment—the full extent of which are still not fully ascertainable or understood—numerous international environmental treaties and declarations have incorporated the precautionary approach into their agreements about sustainable development, environmental protection, health, trade, and food safety. See, e.g., COMEST REPORT, *supra* note 251; *SPS Agreement Training Module: 8.2 The Precautionary Principle*, WORLD TRADE ORG. (2004), http://vi.unctad.org/resources-mainmenu-64/digital-library?task=dl_doc&doc_name=sps-training-module.

However, implementation of the precautionary principle does not necessarily involve a flat ban on the suspected dangerous substance. Instead, the principle envisions exploring alternatives to possibly harmful actions, especially through use of clean technologies that eliminate waste and toxic substances; placing the burden of proof on proponents of an activity rather than on victims or potential victims of the activity; and bringing transparency and democratic decision making to processes affecting health of workers and the environment.²⁵⁶

Improvements effectuated by the precautionary principle in other regulatory contexts provide model alternatives to the current cost-benefit regime under FIFRA. First, FIFRA's legislative history itself counsels against reading a cost-benefit requirement into the language of the statute. The Food Quality Protection Act (FQPA), which regulates consumer exposure to pesticide residues on food products, mandates a far stricter health standard than FIFRA. Additionally, the California Department of Pesticide Regulation (CDPR) has rejected the consideration of benefits in its registration process, except in extremely limited circumstances. Finally, the European Union's recent toxic substances regulatory framework, REACH, has contemplated increased disclosure requirements and the expectation that companies engage in discussions of safer possible alternatives.

A. The Legislative History of FIFRA Itself Counsels Against a Cost-Benefit Analysis

Unlike the current EPA practice, a more equitable registration process would consider the benefits of a pesticide in only limited circumstances. FIFRA's own legislative history supports this approach. The Senate Commerce Committee, which created the standard, read FIFRA not to tolerate any adverse effects "unless there [were] overriding benefits from the use of a pesticide."²⁵⁷ According to Professor William Rodgers, this "unreasonable adverse effects" language was intended to create an environmentally stringent standard for registration.²⁵⁸ Viewed in light of this history, the current interpretation, requiring cost-benefit analysis, is actually a strained construction of the statute's language.

In light of Congress's instruction that a pesticide's adverse effects not be tolerated unless "overriding benefits" exist, some commentators have argued that a more sensible interpretation of "unreasonable adverse effects" would involve separating benefits into two categories.²⁵⁹ The first category would encompass benefits that justify taking significant risks. These benefits include

256. See SEHN FAQ, *supra* note 252.

257. S. REP. NO. 92-970, at 11 (1972); *see also* H.R. REP. NO. 92-511, at 14 (1971).

258. RODGERS, *supra* note 133, § 5.4(a).

259. Mary Jane Angelo, *The Killing Fields: Reducing the Casualties in the Battle Between U.S. Species Protection Law and U.S. Pesticide Law*, 32 HARV. ENVTL. L. REV. 95, 140 (2008).

the suppression of a particularly devastating species of pest that, in the absence of nonchemical or less risky alternatives, might cause severe economic losses to agribusinesses or dramatically increased food prices.²⁶⁰ A second benefit under this category would be preventing a virulent outbreak of disease.²⁶¹ The second category would cover those benefits that are not “overriding” under FIFRA.²⁶² For example, a pesticide that is more cost-effective than other alternatives, and thus would save businesses moderate sums of money if allowed to stay on the market.²⁶³

B. The Food Quality Protection Act Observes a Heightened Standard of Safety to Protect Consumers

In contrast to its treatment of farmworkers, the EPA goes to great lengths to protect the health of consumers who purchase and consume agricultural food products that were treated with pesticides. These measures include instituting a more stringent “reasonable certainty [of] no harm” standard to ensure that any pesticide residue on a food product that exceeds this threshold will be banned under applicable laws.²⁶⁴ Under the FQPA, this standard does not consider benefits except in extremely limited circumstances.²⁶⁵ FIFRA, on the other hand, mandates the consideration of benefits in every instance, even in those where considerable dangers to workers and the environment are present.

With the passage of the FQPA in 1996, Congress also addressed concerns about children’s susceptibility to pesticides. For example, it required the EPA to assess children’s susceptibility to pesticides when making decisions about pesticides and to “include an additional safety factor to account for developmental risks and incomplete data when considering a pesticide’s effect on infants and children.”²⁶⁶ The passing of the FQPA marked the first time the EPA was asked to directly address the risks pesticides pose to infants and children.²⁶⁷ Former President Bill Clinton applauded the bill’s passage, remarking that “[i]f a pesticide poses a danger to our children, then it won’t be in our food.”²⁶⁸ While the concern that legislators show for children at risk of consuming pesticides on food products is justified, that concern is noticeably

260. *Id.*

261. *Id.*

262. *Id.*

263. *Id.*

264. Federal Food, Drug, and Cosmetic Act § 408(b)(2), 21 U.S.C. § 346a(b)(2) (2012).

265. 21 U.S.C. § 346a(b)(2)(B). Benefits may be considered in two circumstances. The first is when the pesticide protects consumers from health risks greater than those posed by the pesticide. The second is when the pesticide’s use is needed to avoid a “significant disruption in domestic production of an adequate, wholesome, and economical food supply,” so long as specified aggregate exposure risk requirements are also satisfied. *Id.*

266. See *Children Are at Greater Risks from Pesticide Exposure*, *supra* note 93.

267. *Id.*

268. *Clinton Praises Bill Regulating Pesticides*, N.Y. TIMES (Aug. 4, 1996), www.nytimes.com/1996/08/04/us/clinton-praises-bill-regulating-pesticides.html.

absent in Congress's treatment of farmworkers' children who labor in pesticide-saturated fields with their parents and are exposed at far greater concentrations than consumers of food products.²⁶⁹

In light of these contradictory standards, it is difficult to avoid the conclusion that the EPA values the lives of farmworkers—most of whom are poor and Latino—less than the lives of U.S. consumers. The farmworkers that bear the brunt of the occupational exposure to pesticides are an unpopular and non-vocal minority whose presence in this country is fraught with political suspicion and fear.²⁷⁰ Such attitudes are unfortunate, since farmworkers are human beings who deserve equal treatment regardless of their race or immigration status. An adoption of a more stringent health standard, one that more closely approximates the standard governing pesticide exposure for consumers of food products, would vindicate their rights.

C. The EPA Should Adopt the California Department of Pesticide Regulation's Approach, Which Employs Cost-Benefit Analysis Only in Very Limited Circumstances

The CDPR does not consider benefits in its registration process except in limited circumstances. California, the seventh largest economy in the world,²⁷¹ plays a major role in the international production and trade of agricultural commodities. The value of California agriculture exceeds that of most countries and is larger, for example, than the value produced by major agricultural actors like Canada or Australia.²⁷² Farmworker organizations estimate that roughly a third of all farmworkers in the United States work in California agriculture.²⁷³ Although the state has an obvious incentive to preserve the economic health of the farming sector, the CDPR does not allow consideration of economic benefits in its evaluation of a pesticide's registration

269. FARMWORKER JUSTICE, *supra* note 30, at 3.

270. See, e.g., Bruce Drake, *Tea Party Republicans Believe Legal Status Would Reward Undocumented Immigrants*, PEW RESEARCH CTR.: FACTTANK (July 11 2013), <http://www.pewresearch.org/fact-tank/2013/07/11/tea-party-republicans-believe-legal-status-would-reward-undocumented-immigrants>.

271. Michael B. Marois & Shin Pei, *Brown's California Overtakes Brazil With Companies Leading World*, BLOOMBERG BUSINESS (Jan. 16, 2015, 12:00 AM), <http://www.bloomberg.com/news/articles/2015-01-16/brown-s-california-overtakes-brazil-with-companies-leading-world>.

272. Daniel Sumner et al., *The Measure of California Agriculture and Its Importance in the State's Economy*, in CALIFORNIA AGRICULTURE: DIMENSIONS AND ISSUES 57, 57 (Jerry Siebert ed., 2003).

273. *Who We Serve*, FARMWORKERJUSTICE.ORG, <http://www.farmworkerjustice.org/about-farmworker-justice/who-we-serve> (last visited June 15, 2015); see also AGUIRRE INT'L, *THE CALIFORNIA FARM LABOR FORCE: OVERVIEW AND TRENDS FROM THE NATIONAL AGRICULTURAL WORKERS SURVEY* vii (2005), <http://agcenter.ucdavis.edu/documents/CalifFarmLaborForceNAWS.pdf>.

status except in extremely limited circumstances.²⁷⁴ As compared to the EPA's registration process, this approach more adequately safeguards public health by allowing the CDPR to deny the registration of pesticides shown to pose a threat of adverse health effects to individuals and the environment.

Unlike the EPA, the CDPR will only consider benefits if it is impossible to mitigate any significant adverse effects and if there is no feasible alternative that would substantially reduce any significant adverse effect.²⁷⁵ Only then may the CDPR consider registration. However, the department has never used that discretion to register a pesticide.²⁷⁶ For this reason, as well as reasons relating to insufficient toxicology data or inadequate margins of safety, the CDPR has often denied registration to pesticides that the EPA has approved.²⁷⁷ In essence, the basic rule is that the department will permit the use of a pesticide if it decides the pesticide can be safely applied under existing label directions and any additional regulatory and permitting requirements.²⁷⁸

A prominent example of how the CDPR registration process is more protective of public health than the EPA's registration process involves the registration of the pesticide methyl iodide. Methyl iodide, which until 2012²⁷⁹ was commonly applied in strawberry fields, is a carcinogen that causes cancer and late-term miscarriages.²⁸⁰ Although the CDPR's ultimate decision to register methyl iodide for usage on the market in 2010 stirred considerable controversy among the public,²⁸¹ the department's evaluation process illustrates its superior responsiveness to health concerns. CDPR scientists reviewed in excess of 175 studies on the pesticide's effects on health and the environment.²⁸² The evaluation accounted for potential exposures of people

274. CAL. DEP'T OF PESTICIDE REGULATION, A GUIDE TO PESTICIDE REGULATION IN CALIFORNIA 25 (2011).

275. *Id.*

276. *Id.*

277. *Id.* Because regulation of any particular service or activity is usually comprised of several overlapping layers of government oversight, a short note on the interaction between the CDPR and the EPA's registration processes is warranted. In short, the CDPR's registration process operates independently of the EPA's registration process. See RACHAEL E. GOODHUE & KELLY WIERSMA, PESTICIDE REGULATION IN CALIFORNIA: A PRELIMINARY ASSESSMENT OF CURRENT COSTS AND BENEFITS, AND IMPLICATIONS FOR FUTURE POLICY REFORM AND RESEARCH (Aug. 2001), <http://ageconsearch.umn.edu/bitstream/20588/1/sp01go09.pdf>. A company that registers its pesticide with the EPA must also register it with the CDPR. *Id.* California also requires separate registration processes for each use for each crop. *Id.*

278. *Id.*

279. *Methyl Iodide Registration*, CAL. DEP'T OF PESTICIDE REGULATION, http://www.cdpr.ca.gov/docs/registration/methyl_iodide.htm (last visited June 13, 2015) (stating that in 2012, "DPR cancelled all products containing methyl iodide at the request of the registrant").

280. UNITED FARM WORKERS, METHYL IODIDE: THE FACTS (Mar. 2011), <http://www.ufw.org/pdf/FINALMeIFacts.pdf>.

281. See *Maker of Cancer-Causing Methyl Iodide Pulls Federal Registration*, EARTHJUSTICE (Nov. 21, 2012), <http://earthjustice.org/news/press/2012/maker-of-cancer-causing-methyl-iodide-pulls-federal-registration> (describing public opposition to CDPR's registration of methyl iodide in 2010).

282. CAL. DEP'T OF PESTICIDE REGULATION, ABOUT DPR'S DECISION TO REGISTER METHYL IODIDE 2 (Dec. 2010), http://www.cdpr.ca.gov/docs/registration/mei_pdfs/mei_final_decision.pdf.

who lived or worked in areas close to the fields where the pesticide was applied.²⁸³ The CDPR did not take into account the economic benefits of continued usage. Furthermore, the CDPR applied a more health-protective exposure standard than the EPA, even though the EPA standard necessitated a far more comprehensive range of controls aimed at ensuring worker and public safety.²⁸⁴ These controls included larger buffer zones, the requirement that fewer acres be treated at once, and reduced application rates.²⁸⁵

Such measures may not have been possible if the CDPR's mandate had instructed it to consider the benefits of the pesticide's usage to growers. Because the CDPR's mandate allows it to register a pesticide only if the CDPR deems that usage safe, the CDPR must implement more stringent controls in protecting public health. Because no considerations of the pesticide's benefits are accounted for in the department's assessment, the CDPR is more able than the EPA to implement health-protective registration decisions.

California's standing as a preeminent agricultural producer that has nonetheless eschewed the inequitable cost-benefit balancing test mandated by FIFRA should urge a reconsideration of the necessity of that standard. If California can implement a registration process that evaluates the benefits of a pesticide in only very limited circumstances, and has done so without imposing significant economic consequences upon growers operating within its borders, then other governmental entities should follow suit.²⁸⁶

D. The European Union's New Chemical Regulation Scheme, REACH, Suggests Several Avenues of Improvement for Pesticide Regulation in the United States

REACH, the European Union's chemical regulatory scheme, contains a number of novel, precautionary requirements that should serve as a model to legislators looking to refashion pesticide regulation in the United States. Though wholesale revision of FIFRA is unlikely to occur anytime in the near

283. *Id.*

284. *Id.*

285. *Id.*

286. A change of pesticide regulation at the federal level may be necessary to account for states' inability to regulate pesticides under more health-protective standards. While other states would ideally be able to implement more stringent state-wide regulatory schemes of their own initiative, they may lack the economic power to do so. California's status as the bread-basket of the country may grant it unique bargaining power vis-à-vis the agricultural industry. See Brian Brown, *The Last Drop: America's Breadbasket Faces Dire Water Crisis*, NBC NEWS (July 6, 2014, 12:49 PM), <http://www.nbcnews.com/news/us-news/last-drop-americas-breadbasket-faces-dire-water-crisis-n146836>. By dint of this status, California may retain the economic leverage to insist on implementing more stringent standards of pesticide regulation—economic leverage that other states lack. In other words, other states may not be able to attract growers if they insist on a similarly rigorous standard of regulation. In such a scenario, a revision of the regulatory system at the federal level would be necessary to ensure that federal and state governments' imperative to protect the public health is not undermined by market forces.

future, an assessment of the workability of REACH's large and varied menu of regulatory options, and its potential applications to the U.S. regulatory system, would strengthen the EPA's attempts to measurably improve public health and the environment.

REACH contains the most rigorous testing requirements of any regulatory regime in the world.²⁸⁷ It is composed of "four separate bodies of regulation (registration, evaluation, authorization, and restriction) that govern the cradle-to-grave manufacture, importation, sale, and use of industrial chemicals in the European Union."²⁸⁸ This rigorosity was prompted in part by widespread concerns about the effects that toxic chemicals in various products might have on children's health.²⁸⁹ Under REACH, manufacturers and importers of a chemical substance must collect a basic data set on the chemical's toxicological properties. They must then ensure that the envisioned uses of the chemical are safe and must share this information, in the form of a registration dossier, with European Chemicals Agency (ECHA), the European Union Agency tasked with implementing and enforcing REACH.²⁹⁰ With respect to its registration requirements, REACH is similar to FIFRA.

In many other ways, however, REACH is dissimilar to FIFRA. For example, REACH's regulatory scope extends more broadly than FIFRA's. Further, it regulates chemicals in a more creative manner than the straightforward prescriptive measurements authorized under FIFRA.²⁹¹ REACH distinguishes itself from FIFRA through a number of specific mechanisms: REACH incentivizes the substitution of alternatives for suspect chemicals; requires informational disclosures as a way to activate market pressures on companies; and involves "downstream users" of chemicals in greater, self-regulatory roles. The remainder of this Part details each of these mechanisms so that U.S. policymakers may consider modeling FIFRA after REACH, given the greater concern that the EU regulatory scheme exhibits for the health of the public and the environment.

First, REACH provides incentives to use substitutes for potentially toxic chemicals. For example, products containing active substances approved as candidates for substitution are subject to comparative assessment of the chemical to the potential substitute.²⁹² Regulators withdraw such products if that assessment identifies alternative products or methods of control that are

287. Daniel A. Farber, *Rethinking the Role of Cost-Benefit Analysis*, 76 U. CHI. L. REV. 1355, 1372 (2009).

288. ADAM D.K. ABELKOP ET AL., REGULATING INDUSTRIAL CHEMICALS: LESSONS FOR U.S. LAWMAKERS FROM THE EUROPEAN UNION'S REACH PROGRAM (2012).

289. Farber, *supra* note 287, at 1372.

290. *Id.* at 1384–85.

291. *Id.* at 1385 (describing "[p]ublic disclosure of risk information and the use of self-regulation along the supply chain" as untraditional means of regulation).

292. U.K. REACH COMPETENT AUTH., REACH - THE BASICS 2 (Nov. 2012), <http://www.hse.gov.uk/reach/resources/basics.pdf>.

significantly safer and can be used without significant drawbacks.²⁹³ So, for high-risk chemicals, companies proposing the usage of a particular pesticide must discuss the existence of safer alternative substances or technologies. Furthermore they must submit plans to substitute for these safer alternatives if available.²⁹⁴ Significantly, companies must show that the risks of the chemical are sufficiently controlled or that the benefits of using the chemicals exceed the risks.²⁹⁵

Though this recourse to cost-benefit analysis echoes the re-registration and cancellation processes under FIFRA, the mandatory layer of alternatives is one way to ensure safer health outcomes for workers and the environment alike. Consideration of alternatives may be of particular pertinence in the pesticides registration context. Given the wide range of substitute pest-management techniques that the EPA failed to consider in its decision to phase-out AZM (e.g., alternative chemicals, integrated pest management, and organic approaches), the agency obviously has no mandate to evaluate alternatives.²⁹⁶

Second, REACH employs non-traditional regulatory strategies such as requirements for public disclosure of risk information. For example, the identification of a substance as a Substance of Very High Concern and its inclusion onto the relevant candidate list creates a legal obligation on the part of the manufacturer to notify its customers and the authorities of the presence of those substances.²⁹⁷ These requirements have the potential to trigger market pressures against toxic sources.²⁹⁸ Commentators have noted the incentives REACH's informational requirements have created for companies to voluntarily switch away from chemicals of high concern to avoid the possible burdens of regulation.²⁹⁹

These disclosure requirements are similar to laws in the United States that mandate informational disclosures, such as California's Proposition 65, which governs product warning labels, and the Toxic Release Inventory, a federal program created by the Emergency Planning and Community Right-to-Know Act.³⁰⁰ As some commentators have noted, these "'right-to-know' regimes allow citizens and consumers not only to know about the risks they face, but also empower them to do something about those risks."³⁰¹ Implementing informational requirements in the pesticides pesticide context would create

293. *See id.*

294. *Id.*

295. *Id.*

296. *See* ACKERMAN, *supra* note 86, at 116–17.

297. *Candidate List Substances in Articles*, EUROPEAN CHEMS. AGENCY, <http://echa.europa.eu/web/guest/regulations/reach/candidate-list-substances-in-articles> (last visited June 15, 2015).

298. Farber, *supra* note 287, at 1385.

299. *Id.*

300. Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, 150 U. PA. L. REV. 1553, 1583 (2002).

301. *Id.* at 1582.

beneficial pressures on industry to move away from suspect pesticides and identify cost-effective alternatives. It would simultaneously arm consumers with important knowledge about chemicals that they may be ingesting or otherwise exposing themselves to.

Third, REACH differs from FIFRA in that it envisions a more proactive, self-regulatory role for so-called “downstream users” of chemicals—those firms or actors that use a chemical substance in the course of their industrial or professional activities.³⁰² Such downstream users may be in a position to implement measures that reduce exposures to the chemical. By making information on the hazardous properties of chemicals more transparent to the various actors along a supply chain, the ECHA intends for companies to improve risk management voluntarily as a matter of good business practices.³⁰³ Various enforcement trainings targeted specifically at downstream users seek to ensure that the risk-management measures described in registration documents are implemented to protect human health and the environment.³⁰⁴ Making pesticide data in the United States more transparent to downstream users, such as wholesalers or retailers of agricultural goods, may similarly improve health outcomes by extending responsibility for a pesticide’s effects to actors beyond the immediate producer.

CONCLUSION

To prevent the EPA from registering unsafe pesticides like AZM in the future, policy makers should modify FIFRA’s cost-benefit analysis to be more protective of human health and the environment. The CDPR’s approach, as well as REACH, the European regulatory framework, are instructive here. REACH’s incentives for growers to use substitutes in place of potentially dangerous pesticides, along with its requirements for public disclosure of risk information, are novel ways to achieve a health-protective regime. Like California’s regulatory scheme, FIFRA’s cost-benefit analysis should be amended to allow for a consideration of benefits in only a few types of situations, such as in a public health crisis. As a general matter, the precautionary principle, which advocates taking action against threatened harm to the public health even in the absence of full scientific certainty, should inform the EPA’s approach. Such an approach would enable the EPA to carry out its public agenda more effectively.

As the AZM re-registration controversy shows, it is too easy to overestimate economic profits to growers and underestimate health risks to workers and the environment. Two changes to FIFRA would go a long way toward enabling the EPA to safeguard the health of the populations most

302. *Downstream Users*, EUROPEAN CHEMS. AGENCY, <http://echa.europa.eu/regulations/reach/downstream-users> (last visited June 15, 2015).

303. ABELKOP ET AL., *supra* note 288, at 12.

304. *Id.*

vulnerable to pesticide exposure. First, the EPA should drastically limit the circumstances under which benefits are considered in the registration or cancellation process, as under California's approach. Second, it should activate any number of market and informational pressures on pesticide manufacturers, as under REACH's approach. Where so much information on exposure, health risks, and the number of worker poisonings is uncertain, and where so much for workers and the environment is at stake, the EPA's ability to protect the lives and health of vulnerable populations should not be captive to growers' economic profits.

