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Radical Technology-Forcing in Environmental Regulation

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I. INTRODUCTION

In the opening scene of *Putney Swope*, an off-beat, low-budget movie of the late 1960s, the chairman of the board of a large advertising agency, in the midst of delivering some bad financial news to the board of directors, suffered a fatal heart attack and fell face down on the large conference table. With the chairman spread out on the table, the board proceeded immediately to the next order of business—electing a new chairman. The bylaws, however, prevented any board members from voting for themselves. Nearly all of the board members voted for the token African-American director, a musician named Putney Swope, because each concluded that none of the other directors would vote for him. Having been duly elected, Swope moved to the head of the table to address the nervous group of aging white gentlemen. Swope then launched into his speech: "The changes I'm going to make will be minimal. I'm not going to rock the boat. Rocking the boat's a drag. What you do is sink the boat. And there's no sense sinkin' nothin' unless you can salvage with productive alternatives."[1] The scene suddenly shifted to the same boardroom a short time later. Swope was still the chairman, but a garish assembly of social outcasts replaced the old board and proceeded to take the company in a hazily conceived, but radically different direction.

Although the remainder of the movie is entirely forgettable, the opening scene left such a strong impression on me that the title is now a verb in my lexicon. For me, to "Putney Swope" something is to replace it with something radically different, even in the face of substantial doubts that the replacement will work or that such a substitute even exists. An author Putney Swopes an early draft of a manuscript when he or she throws it in the trash, rather than attempting to revise the existing work product. The United States government has Putney Swoped the federally sponsored projects such as the breeder reactor, the Super Sonic

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1. PUTNEY SWOPE (RCA/Columbia 1969).

Transport, and the superconducting supercollider, and it may one day Putney Swope nuclear warheads. The federal government can also Putney Swope private activities that pose unacceptable health and environmental risks in the hope that private entrepreneurs will produce better alternatives within reasonable time frames. This Essay will briefly examine radical technology-forcing through banning, or phasing out items or activities a la Putney Swope. This Essay will offer a few brief examples of such radical technology-forcing in action, and it will suggest situations in which such actions may prove feasible, or may fail.

II. RADICAL TECHNOLOGY-FORCING IN CONGRESS AND THE COURTS

American courts have generally been reluctant to engage in radical technology-forcing in common-law nuisance actions. When Oscar Boomer asked the New York Court of Appeals[2] to shut down the Atlantic Cement Company's dirty and noisy Portland cement plant that was built adjacent to his property, the court declined, even though existing precedent rather clearly mandated abatement.[3] The court did not share Boomer's confidence that Atlantic Cement would come up with a suitable clean-up technology if the company was told in no uncertain terms that it would have to shut the plant down in eighteen months in the absence of a suitable solution.[4]

Partially in response to this judicial tentativeness, Congress enacted the first round of environmental statute amendments in the early 1970s. Sponsors of the Clean Air Act amendments of 1977[5] and the Federal Water Pollution Control Act amendments of 1972[6] spoke of the need to "force technology" to meet the needs of a more environmentally sensitive public. To force technology meant different things in different regulatory contexts, however. In the clean water context, it initially meant forcing the industrial laggards to install better-than-average technologies in five years and top-of-the-line technologies in ten years. Although this technology-based technology-forcing brought about tremendous decreases in industrial discharges of conventional water pollutants, it did not inspire industries to significantly change their policies. They were able to meet

2. Boomer v. Atlantic Cement Co., 257 N.E.2d 870, 872-73 (N.Y. 1970).

3. *Id.* at 870-71.

4. *Id.* at 872-73.

5. Clean Air Act Amendment of 1977, Pub. L. No. 95-95, 91 Stat. 685 (codified as amended in scattered sections of 42 U.S.C.).

6. Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, 86 Stat. 816 (codified as amended in scattered sections of 33 U.S.C.).

nearly all of the first-round standards and most of the second-round standards by adding existing technology to the "end-of-the-pipe."[7]

The quality-based media approach to the Clean Air Act had the potential to force the engineers to come up with new approaches to pollution control, at least in those areas that were not likely to achieve the ambient air quality standards by the statutory deadlines. But as the states failed to impose stringent emissions limitations in state implementation plans, and as it became increasingly apparent that the Environmental Protection Agency (EPA) would either extend or ignore the statutory deadlines, the media quality-based approach quickly lost its potential to force technology. In both cases the EPA was generally either unwilling or unable to shut down individual sources or industries. Rather, it merely nudged industries forward—in the case of the Clean Water Act[8]—or encouraged the states to send a stronger message to their heaviest polluters—in the case of the Clean Air Act.[9]

A. Mirex

Ironically, the EPA first successfully adopted a radical technology-forcing approach in the pesticides regulation context, where technology-forcing rhetoric was virtually nonexistent. When the EPA prohibited the use of the pesticide dichloro-diphenyl-trichloro-ethane (DDT), it could point to slightly more expensive substitutes that would kill the target insects if DDT was no longer available. When the EPA canceled the use of related pesticides aldrin and dieldrin, it could point inter alia to heptachlor and chlordane as substitutes for all economically important uses. When it came time to cancel heptachlor and chlordane, however, the agency could not as confidently predict that cheap substitutes would be available for all important uses, and it refrained from canceling the pesticides for those uses. For example, the agency did not cancel the registrations of chlordane for termite control because EPA staffers were

7. D. Bruce La Pierre, *Technology-Forcing and Federal Environmental Protection Statutes*, 62 IOWA L. REV. 771, 811 (1977).

8. Clean Water Act of 1977, Pub. L. No. 95-217, 91 Stat. 1566 (codified as amended at 33 U.S.C.A. §§ 1251-1387 (West 1986 & Supp. 1993)).

9. The EPA has always had the power under the Clean Air Act to promulgate a Federal Implementation Plan (FIP) when the state fails to submit an adequate state implementation plan. 42 U.S.C. § 7410(c)(1) (1988 & Supp. III 1991). For many reasons, however, this power has seldom been exercised. The EPA wrote very few FIPs until the courts began ordering it to do so in the late 1980s. *See, e.g.*, Delaney v. EPA, 898 F.2d 687, 695 (9th Cir.), *cert. denied*, Reilly v. Delaney, 498 U.S. 998 (1990); McCarthy v. Thomas, 17 Envtl. L. Rep. (Envtl. L. Inst.) 21,214 (D. Ariz. Aug. 10, 1987).

not convinced that the pesticide industry could produce an acceptable substitute for chlordane in a relatively brief period of time.[10]

The agency adopted a more radical approach with respect to the pesticide mirex. After initiating and partially completing a lengthy formal information-gathering hearing regarding mirex, a potent killer of the notoriously aggressive imported fire ant, the EPA initiated settlement negotiations. Initially the primary parties involved in these negotiations included the Environmental Defense Fund (EDF), an environmental group that wanted mirex canceled; Allied Chemical Company, the sole registrant of technical grade mirex; the United States Department of Agriculture, which sprayed mirex out of B-26 bombers over hundreds of southern counties as part of the federally sponsored fire ant eradication program; the Southern Plant Board, composed of the agriculture commissioners of the states to which the eradication program's federal dollars were directed; and the EPA, which maintained an official position of strict neutrality with respect to the question of whether mirex should be canceled.[11]

As the parties negotiated the prospects of mirex dimmed. An EPA survey revealed that mirex, which caused cancer in laboratory mice, was detected in the adipose tissue of a substantial proportion of the population of the states in which the eradication program was in effect.[12]

Allied Chemical Company decided to cease production of pesticides in the wake of a disaster in Hopewell, Virginia, in which a fly-by-night company operating from an abandoned gas station polluted the James River and the lower half of Chesapeake Bay with a related pesticide, kepone, which Allied provided to the company.[13] Although Allied sold the mirex manufacturing plant to the State of Mississippi for one dollar, some state legislators were uncomfortable about the state's entry in the pesticide manufacturing business. Pressure also grew on the USDA to abandon the costly eradication program. As a result of the considerable

10. Exempting residential termite pesticide use from the chlordane cancellation was probably a mistake. Contrary to agency predictions, thousands of people were exposed to chlordane in later years because of that remaining use. *Ant Poison Under Fire*, CHEMICAL WK., July 28, 1976, at 23.

11. *See* Bill Richards, *EPA Ponders Approving a New Weapon against Fire Ant*, WASH. POST, Feb. 14, 1978, at A9.

12. *Ant Poison Under Fire*, *supra* note 10; *Allied Fined Maximum*, CHEMICAL WK., Oct. 13, 1976, at 23.

13. *See Spread of Deadly Chemcial—and the Ever Widening Impact*, U.S. NEWS & WORLD REP., Sept. 6, 1976, at 43.

leverage that these events provided to the EDF in the settlement negotiations, it refused to settle for anything short of a complete ban of mirex.[14]

The problem with a complete ban was the absence of any registered substitute for killing fire ants except for chlordane, which itself was subject to cancellation proceedings. While USDA and EPA program officials fretted that with no pesticidal weapons on the horizon the fire ants would march unimpeded across the South and Midwest, EDF and EPA attorneys confidently predicted that if fire ants were enough of a problem to inspire a market for fire ant killers, innovative American companies would come up with suitable alternatives.[15] Conversely, so long as the USDA was willing to provide mirex free of charge, it would be overused and a market for substitutes would never develop. Ultimately, the parties agreed to produce and use mirex in diminishing quantities during a two-year phase-out period.[16] As predicted, four companies asked the EPA to register substitutes for mirex well within the phase-out period.

Fifteen years later, fire ants remain a nuisance in all of the states that were part of the fire ant eradication program, but their range has not extended appreciably. When an infestation becomes unmanageable, a landowner can choose from among several formulations of direct-action insecticides or baits, and can even apply a slower acting but more effective biological ant killer. Most importantly, the natural environment of the nine southern states is no longer exposed to an exceedingly persistent, potentially carcinogenic organochlorine pesticide.

B. Lead Phase Down

Another early, yet less successful EPA attempt at radical technology-forcing was the lengthy effort to eliminate tetraethyl lead from gasoline. For decades prior to the enactment of the 1970 Clean Air Act Amendments, petroleum refiners used tetraethyl lead as a fuel additive in order to increase the octane rating of gasoline, and to reduce engine "knocking." After serving this useful purpose, the lead would exit the tailpipe and remain airborne for some time, where residents of urban neighborhoods could breathe it. Airborne lead would also fall to the ground, where children could ingest it.[17] In both cases, airborne lead

14. *See generally Is EPA Stifling Development of New Pesticides?*, CHEMICAL WK., Oct. 29, 1975, at 25.

15. Ward Sinclair, *EPA Pressed to Approve New Fire Ant Pesticide*, WASH. POST, Feb. 20, 1982, at A6.

16. *End of Line for Mirex*, CHEMICAL WK., Nov. 3, 1976, at 18.

17. Bloodborne lead can cause various maladies, including anemia, reproductive defects, and cognitive impairment.

increased the already high level of lead in the blood of urban residents.[18] When the EPA first began devoting attention to the health effects of airborne lead in the early 1970s, approximately ninety percent of all of the gasoline burned in the United States contained lead additives.[19]

The EPA's first attempt to regulate lead in gasoline resulted from the fact that tetraethyl lead in gasoline tends to poison catalytic converters. The 1970 amendments required automobiles to reduce emissions of hydrocarbons, oxides of nitrogen, and carbon monoxide to certain specified levels by a certain date, and the EPA soon became convinced that the only technology capable of meeting the statutory requirements was the catalytic converter. Since tetraethyl lead in gasoline would reduce the effectiveness of such converters, the EPA promulgated a rule in 1973 requiring service stations to offer at least one grade of unleaded gasoline, which the EPA defined as "gasoline with no more than 0.05 grams of lead per gallon of gasoline (gpg)."[20] The petroleum industry bitterly contested this regulation, arguing that it would be impossible to clean out existing lead-contaminated tanks and fuel lines by the 1975 deadline. The Court of Appeals for the D.C. Circuit, however, upheld the regulations in all important areas, and after an EPA-granted delay, service stations began to offer unleaded gasoline by the late 1970s.[21]

The EPA was also moving on several other fronts. On February 23, 1972 the EPA proposed regulations designed to reduce the lead content in *all* gasoline in accordance with a prescribed phase-down schedule on the ground that leaded gasoline endangered the public health.[22] To a greater extent than the earlier regulations, these health-based regulations depended upon a "leap of faith" that the refining industry would be able to come up with suitable alternatives for enhancing octane and reducing knocking. The rule required refiners to reduce the lead content of gasoline to 1.7 grams per gallon by January 1, 1975, and to 0.5 grams per gallon by January 1, 1979.[23] The regulations exempted "small refiners"—as defined in the regulations—from the 1975 deadline, but not from the 1979 deadline.[24] The regulation allowed a refiner to "pool" the leaded gasoline that it produced with any unleaded gasoline, so that it could raise the lead content of its leaded gas so long as it produced a

18. 38 Fed. Reg. 33,734, 33,736 (1973).
19. Ethyl Corp. v. EPA, 541 F.2d 1 (D.C. Cir. 1975), *cert. denied*, 426 U.S. 941 (1976).
20. 40 C.F.R. § 80.2(g) (1992).
21. Amoco Oil Co. v. EPA, 501 F.2d 722 (D.C. Cir. 1974).
22. 37 Fed. Reg. 3882 (1972) (to be codified at 40 C.F.R. § 80) (proposed Feb. 23, 1972).
23. 38 Fed. Reg. 33,734 (1973).
24. *Id.* at 33,740.

correspondingly larger amount of unleaded gas.[25] The D.C. Circuit, in an *en banc* opinion that has become a classic in administrative law, upheld the rule against industry arguments that the EPA had not drawn a sufficient connection between lead in gasoline and health effects in human beings.[26] The court also upheld the EPA's determination that alternative fuels and fuel additives would not endanger the public health to the same or to a greater degree than lead additives.[27]

Environmental groups were not satisfied with the EPA's exclusive reliance on the phase-down approach, and they persuaded the Second Circuit in 1976 to order the EPA to list lead as a "criteria pollutant" for which it must promulgate national ambient air quality standards (NAAQS).[28] Two years later, the EPA promulgated final regulations establishing a primary NAAQS for lead of 1.5 micrograms per cubic meter.[29] Two years after that, on June 27, 1980, the D.C. Circuit upheld the standard,[30] and the states began writing state implementation plans to ensure that lead emissions from all sources—including stationary sources such as lead smelters—would not exceed the NAAQS three years after approval of the plans.[31]

Had the EPA exclusively relied on the ambient air quality standard approach, the states would have been obligated to regulate stationary and mobile sources of lead so as to achieve the NAAQS by the statutory deadline. Since no individual state could have required oil companies to reduce the lead content of gasoline, the states would probably have focused their attention on stationary sources and traffic controls of the sort that have proven notoriously unsuccessful for carbon monoxide and photochemical oxidants. As it was, the states could depend upon the national lead phase down to reduce lead emissions from mobile sources, and they simply factored the national lead phase-down projections into their own attainment demonstrations.

The energy crisis of the mid-1970s caused the EPA to extend the phase-down schedule for reaching the 0.5 gpg level from 1979 to October 1, 1982.[32] The exemptions for small refiners also remained in effect.[33]

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25. *Id.* at 33,739.

26. *Ethyl Corp.*, 541 F.2d at 111-12.

27. *Id.*

28. Natural Resources Defense Council v. Train, 545 F.2d 320, 322 (2d Cir. 1976).

29. 45 Fed. Reg. 77,052 (1980).

30. Lead Indus. Ass'n v. EPA, 647 F.2d 1130, 1184 (D.C. Cir.), *cert. denied* 449 U.S. 1042 (1980).

31. *See, e.g.*, 45 Fed. Reg. 77,052 (1980).

32. 45 Fed. Reg. 65,581 (1980).

33. 47 Fed. Reg. 7814 (1982).

During the 1979-1982 extension period, a small subindustry of "blenders" arose to take advantage of the small refiner exemptions. These blenders would purchase inexpensive, low-octane gas from foreign markets and blend in just enough high-octane leaded gas to stay within the small-refiner exemption. Although the major refineries retooled their plants to produce unleaded gasoline almost exclusively by the early 1980s, the small refiners—including the newly created blenders—and the manufacturers of tetraethyl lead were not anxious to see leaded gasoline phased out. After the 1981 inauguration they responded to an invitation from Vice President Bush to suggest rules that should be revisited. At the urging of the Vice President's Task Force on Regulatory Relief, the EPA agreed to consider repealing the lead phase-down rule, and it therefore published a notice of proposed rule making setting out several options that it was considering, including total rescission of the rule.[34] The notice proposed to suspend indefinitely the October 1, 1982 standard for small refiners, and solicited comments on the proper definition of "small refiner" in light of the advent of the blending subindustry.[35] Finally, the Agency proposed to tighten slightly the standard for large refiners to 1.1 grams per *leaded* gallon and to eliminate pooling.[36] Under the proposal, small refiners would have to comply with a 2.5-gram-per-leaded-gallon standard.[37]

The EPA's announcement of its willingness to consider repealing the rule precipitated a loud and angry outcry from environmental groups and advocates of urban children, including the NAACP. At the same time the EPA received pressure from small refiners to extend their exemptions for several more years. In addition to pressing their economic concerns, the small refiners—as had the large refiners in the earlier rule making—argued that the EPA had not established any connection between leaded gasoline and adverse human health effects. While the EPA was considering these outside comments, the Centers for Disease Control published the results of its comprehensive Second National Health and Nutrition Examination Survey (NHANES II) study on blood-lead levels in urban residents.[38] The study showed a very clear correlation between the reduction in use of leaded gasoline—due to the EPA's prior rules—and a decline in blood lead levels.[39] Although the study did not conclude

34. 47 Fed. Reg. 7812 (1982) (to be codified at 40 C.F.R. § 80).
35. *Id.*
36. 47 Fed. Reg. 38,078, 38,079 (1982) (to be codified at 40 C.F.R. § 80).
37. *Id.*
38. *See generally* 47 Fed. Reg. 38,070 (1982).
39. Small Refiner Lead Phase-Down Task Force v. EPA, 705 F.2d 506, 527-28 (D.C. Cir. 1983).

that reductions in leaded gasoline use reduced the incidence of any particular illness, it did dramatically demonstrate the effectiveness of the earlier standard. Consequently, the EPA published a final rule that established a uniform standard of 1.1 grams per leaded gallon for large and small refiners alike.[40] Small refiners persuaded the D.C. Circuit, however, that the EPA had not adequately put them on notice of this possible outcome, and the court therefore remanded the standard on January 26, 1983 for reconsideration of several aspects related to small refiners.[41]

The 1.1-grams-per-leaded-gallon benchmark was roughly equivalent to the 0.5-grams-per-gallon standard that the Agency had originally promulgated. The EPA soon discovered, however, that rampant fuel switching was occurring in some parts of the country. The price differential between leaded and unleaded gasoline encouraged some drivers to burn leaded fuel; other drivers believed that unleaded gasoline reduced engine performance to unacceptable levels.[42] As a result, not only were newer automobiles spewing lead into the environment, but their poisoned catalysts were also allowing more carbon monoxide and photochemical oxidants into the air. In addition, the EPA discovered that a lot more leaded gas was being marketed than was indicated by its earlier projections, which were based upon overly optimistic assumptions about fleet turnover. In other words, the limited phase-out approach had failed. Finally, more recent scientific studies demonstrated negative health effects due to exposure to lead at even lower blood levels than the earlier studies had shown.[43]

The EPA concluded from this information that "the rapid reduction and eventual end to the use of lead in gasoline is an appropriate objective."[44] Therefore, on August 2, 1984 the EPA proposed to lower the standard once again to 0.1 grams per leaded gallon, effective January 1, 1986.[45] The EPA determined that a small amount of lead would still be needed in gasoline burned by older vehicles to provide lubrication. Speculating that in the long run leaded gas would no longer be needed as

40. 40 C.F.R. § 80 (1982).

41. *Small Refiner Lead Phase-Down Task Force*, 705 F.2d at 542.

42. 49 Fed. Reg. 31,032 (1984) (to be codified at 40 C.F.R. § 80) (proposed Aug. 2, 1984). Cars equipped with catalytic converters were designed to use only unleaded fuel; therefore, the neck of their gasoline tanks was smaller in diameter than older cars. Fuel nozzles on unleaded gas pumps were correspondingly smaller than nozzles on leaded gas pumps. According to the EPA, fuel switching could be accomplished by removing or damaging the nozzle restrictor at the neck of the gas tank, by using an improper size fuel nozzle, or by funnelling leaded gasoline into the gas tank. *Id.*

43. *Id.*

44. *Id.*

45. *Id.*

substitute lubricants became available and as older automobiles were retired from the fleet, the EPA suggested a complete ban on leaded gasoline by 1995.[46] On March 7, 1985 the EPA promulgated a final rule adopting the 0.1 standard effective January 1, 1986 and reopening the comment period for the proposed total ban by 1995.[47]

Although the Agency has yet to promulgate a final ban on lead in gasoline, the major refiners have converted completely to unleaded gasoline. It is still possible to find a service station that sells leaded gasoline, but they are increasingly rare. As a practical matter, a complete ban has been achieved. Alternatives to leaded gasoline are easily available at affordable prices, and further reductions in blood levels of urban children continue to bear out the wisdom of the phase down. The energy crisis and the Vice President's Task Force extended the phase-down period much longer than necessary, but the effort overall must count as an environmental success story.

C. Asbestos

Asbestos has been widely used for decades as an insulator in residences and by industry, and as a liner for automobile brakes. Industrial hygienists have known for many years that asbestos causes a debilitating disease called "asbestosis" in workers who are exposed to high concentrations of airborne asbestos fibers in the workplace.[48] More recently, scientists have discovered that asbestos fibers cause a rare form of cancer called "mesothelioma" in human beings.[49] Since most scientists agree that no level of exposure is completely safe, airborne asbestos is of concern to the general public as well as workers.

Asbestos posed such a serious threat to workers that the Occupational Safety and Health Administration's (OSHA) very first occupational health standard, promulgated in June 1972, dealt with asbestos.[50] Asbestos was one of the first four substances for which the EPA promulgated national emissions standards for hazardous air pollutants (NESHAPs) under section 112 of the Clean Air Act on March 31, 1971.[51] The common-law courts were also very active in compensating

46. *Id.*
47. 50 Fed. Reg. 9386 (1985) (to be codified at 40 C.F.R. § 80).
48. 40 C.F.R. § 763 (1986).
49. *Id.*
50. Industrial Union Dep't, AFL-CIO v. Hodgson, 499 F.2d 467, 471 (D.C. Cir. 1974).
51. *See* 40 C.F.R. § 61 (1992).

victims of exposure to airborne asbestos—usually workers—after the latent diseases manifested themselves.[52]

As more information on the toxic effects of asbestos became available, OSHA determined that the 1972 standard was not sufficiently protective. Therefore, in 1975 it proposed an amended standard that called for a reduction in the allowable exposure to airborne asbestos from twelve fibers per cubic centimeter (f/cc) to 0.5 f/cc.[53] Nothing came of this proposal until almost ten years later when, in April 1984, OSHA issued a new notice of proposed rulemaking that suggests the standard be lowered to at least 0.5 f/cc and perhaps even to 0.2 f/cc.[54] After lengthy hearings, OSHA promulgated a final rule in July 1986 setting the allowable exposure level at 0.2 f/cc.[55] OSHA settled upon that level because it was the lowest level that employees could feasibly achieve in most workplaces. OSHA concluded that even at that significantly lower level of exposure, employees still faced a "significant risk" of contracting cancer. The D.C. Circuit affirmed the 0.2 f/cc standard, but remanded asbestos cases for consideration of why it was not feasible in some industrial categories to achieve even lower exposure levels.[56]

At the same time that OSHA was deciding whether to lower its standard for asbestos, the EPA was considering an even more radical proposal to ban asbestos in a phase-down process similar to the one used for tetraethyl lead. It was reasonably clear that OSHA only had the power to reduce the workplace exposures to levels that an employer could feasibly achieve with existing pollution reduction technologies; it could not simply eliminate asbestos from the workplace. The EPA, on the other hand, believed that it had the authority under section 6 of Toxic Substances Control Act (TSCA)[57] to get to the root of the problem by banning asbestos in the workplace and elsewhere. Some staffers within the EPA reasoned that since substitutes existed—or would easily become available for all significant uses of asbestos—a complete ban would protect those exposed to airborne asbestos.

In 1979 the EPA issued an Advance Notice of Proposed Rulemaking announcing that it was considering whether to exercise its section 6

52. *See, e.g.*, Borel v. Fibreboard Paper Prods. Corp., 493 F.2d 1076 (5th Cir. 1973), *cert. denied*, 419 U.S. 869 (1974).

53. 40 Fed. Reg. 47,652 (1975) (to be codified at 29 C.F.R. pt. 1910) (proposed Oct. 9, 1975).

54. 49 Fed. Reg. 14,116 (1984) (proposed Apr. 10, 1984).

55. 51 Fed. Reg. 22,612 (1986) (proposed June 20, 1986).

56. Building & Constr. Trades Dep't, AFL-CIO v. Brock, 838 F.2d 1258, 1279-80 (D.C. Cir. 1988).

57. 15 U.S.C. § 2605 (1988).

authority to regulate asbestos.[58] As the EPA came closer to concluding that asbestos should be banned, officials from the Canadian government urged the regulatory review office in the Office of Management and Budget (OMB) to stop the effort in its tracks.[59] In July 1984 the OMB objected to the EPA's tentative conclusion that it should ban about half of all asbestos-containing products.[60] Yielding to further pressure from the OMB, the EPA abandoned the initiative entirely and referred the issue to OSHA and to the Consumer Product Safety Commission.[61] This action precipitated a rare public protest by EPA career employees and harsh criticism from several congresspersons. The EPA then reversed its position once again and issued a notice of proposed rulemaking on January 29, 1986 in which it concluded that asbestos posed an "unreasonable risk to human health." The notice proposed four alternative regulatory approaches for reducing that risk.[62] All but one of the proposed options would have resulted in a total ban of asbestos within ten years. On July 12, 1989 the EPA issued a final rule in which it decided to eliminate most commercial uses of asbestos over a seven-year period.[63]

Several manufacturers of asbestos-containing products challenged the rule in the Fifth Circuit Court of Appeals. In an opinion that severely restricted the radical technology-forcing approach under the TSCA, the court set the rule aside.[64] From the mandate in section six of the TSCA that the EPA choose the "least burdensome" of the regulatory alternatives listed in that section, the court concluded that the statute

58. 54 Fed. Reg. 29,460 (1989).

59. 5 INSIDE THE ADMINISTRATION 6-7 (1986). The Canadian government was concerned about the impact of an asbestos ban on its asbestos mining industry.

60. 5 INSIDE EPA 1 (1984).

61. *EPA to Shift Responsibility to OSHA, CPSC; Plans to Refer Other Chemical Regulations*, 13 PROD. SAFETY & LIAB. REP. (BNA) No. 29, at 73 (July 19, 1985).

62. 51 Fed. Reg. 3738 (1986) (to be codified at 40 C.F.R. pt. 763) (proposed Jan. 29, 1986). The four alternatives included (1) a mixed ban and phase out of asbestos over ten years; (2) a two-stage ban of asbestos, depending upon product usage; (3) a three-stage ban on all asbestos products leading to a total ban in ten years; and (4) labeling of all products containing asbestos. *Id.*

63. 54 Fed. Reg. 29,460 (1989) (to be codified at 40 C.F.R. pt. 763) (proposed July 12, 1989). According to the court of appeals the phase out would occur as follows:

> (1) Stage 1: August 27, 1990: ban on asbestos-containing floor materials, clothing, roofing felt, corrugated and flat sheet materials, pipeline wrap, and new asbestos uses;
> (2) Stage 2: August 25, 1993: ban on asbestos-containing "friction products" and certain automotive products or uses;
> (3) Stage 3: August 26, 1996: ban on other asbestos-containing automotive products or uses, asbestos-containing building materials including non-roof and roof coatings, and asbestos cement shingles.

Corrosion Proof Fittings v. EPA, 947 F.2d 1201, 1208 n.2 (5th Cir. 1991).

64. *Corrosion Proof Fittings*, 947 F.2d at 1201.

established a "least-to-most-burdensome hierarchy" of regulatory options.

> In order to impose a regulation at the top of the hierarchy—a total ban of asbestos—the EPA must show not only that its proposed action reduces the risk of the product to an adequate level, but also that the actions Congress identified as less burdensome also would not do the job. The failure of the EPA to do this constitutes a failure to meet its burden of showing that its actions not only reduce the risk but do so in the Congressionally-mandated *least burdensome* fashion.[65]

Before the EPA may ban a chemical under the TSCA, it must first analyze the costs and benefits of all the alternatives.

> Upon an initial showing of product danger, the proper course for the EPA to follow is to consider each regulatory option, beginning with the least burdensome, and the costs and benefits of regulation under each option. The EPA cannot simply skip several rungs, as it did in this case, for in doing so, it may skip a less burdensome alternative mandated by TSCA.[66]

This very burdensome analytical requirement will no doubt discourage the EPA from attempting to phase out chemicals under the TSCA in the future.

III. CONCLUSION

Although radical technology-forcing is not a solution to all environmental pollution problems, in some contexts it is superior to the two primary alternative approaches—the media quality-based approach and the technology-based approach.

The media quality-based approach requires the regulatory entity to make extremely difficult judgments about the effects of a toxic substance on affected organisms, the degree to which discharges or emissions of the substance must be reduced to bring those effects to within acceptable levels, how any such reductions should be apportioned among the existing—and perhaps future—sources of the substance, and the time limits within which such reductions must be accomplished. The media quality-based approach is especially difficult to implement because pollution control technologies are very expensive and most of the sources of the pollutant have been in existence for many years. In this context agencies and legislatures are inclined either to "grandfather" existing sources, thereby

65. *Id.* at 1217 (footnote omitted).
66. *Id.*

shifting the burden of pollution reduction to new sources, or to extend the deadlines for attaining the media quality-based standards.[67]

The technology-based approach requires the regulatory entity to divide industries into categories and subcategories, to identify the best pollution control technologies for those categories and subcategories, and to establish limitations based on the feasibility of implementing the model technologies, the cost of compliance, and other relevant considerations. Since cost is always a constraining criterion, there is no guarantee that the technology-based approach will achieve the degree of pollution reduction necessary to protect the exposed organisms. For example, OSHA's feasibility-limited approach to standard setting resulted in an asbestos standard that was feasible to implement, but still left workers subject to a significant risk of contracting mesothelioma.

The primary advantage of radical technology-forcing is its ease of implementation. The media quality inquiry is simply whether the risks at existing levels of exposure are acceptable. If not, then a ban may be appropriate. The economic and technological feasibility inquiry extends only to whether feasible substitutes are likely to be available at the time that the ban or phase out takes effect. Although an agency adopting that approach will have to evaluate the risks posed by the relevant substance or activity and the availability of substitutes, it will not necessarily have to engage in a finely tuned analysis of what risks are associated with particular ambient concentrations—as it must under the media quality approach. Nor will it be required to estimate pollution reduction loads and allocate them among existing sources. Radical technology-forcing can, of course, be adapted to incorporate a more sophisticated analysis of the risks and benefits posed by the subject substance or activity. A pesticide cancellation, for example, involves a balancing of the pesticide's risks against its benefits. To the extent that the agency is obligated to engage

67. Many observers have suggested that these difficulties can be reduced by implementing a system of marketable permits or effluent charges that would force emitters of the pollutant to pay to pollute. This plan would provide an incentive to install pollution reduction technologies, rather than pay the fee or purchase the permit. *See, e.g.*, Robert M. Solow, *The Economist's Approach to Pollution and Its Control*, 123 SCI. 498 (1971); Richard B. Stewart, *Economics, Environment, and the Limits of Legal Control*, 9 HARV. ENVTL. L. REV. 1 (1985). Those techniques, however, are largely applicable only to the problem of divvying up the pollution reduction load among the sources of the pollutant. The regulatory entity must still determine the acceptable level of media quality and estimate the pollution reduction load. Indeed, it is not even clear that charges or marketable permits would solve the problem of existing polluters with political clout. In theory, any source that cannot afford to purchase the permits or pay the charge will have to go out of business. It may be quixotic, however, to believe that politically potent, but cash poor businesses will quietly close their doors once the charge or permit scheme is implemented.

in a finely tuned cost-benefit analysis, however, the advantage of ease of implementation is reduced.

A second significant advantage of radical technology-forcing is its potential to induce genuine technological innovation. The technology-based approach can bring the laggards up to speed, but it rarely brings about actual technological change.[68] The media quality approach is capable of forcing technology indirectly into areas in which it will be difficult to meet the standards by the relevant deadlines. If sources in such areas are confident that they will not be grandfathered and that the deadlines will not be extended, then they may be induced to invest in innovative controls. The record in that regard, however, is not encouraging. For example, Congress has regularly extended the deadlines for attaining the national ambient air quality standards, and some states have legislation forbidding the state environmental agency from imposing requirements on existing sources that are not technologically and economically feasible.[69]

Radical technology-forcing enables the agency to "take a leap of faith" in cases in which substitutes are not presently available. As in the case of mirex, the agency is able to place its faith in the ingenuity of American industry to develop substitutes for the banned substance or activity by the specified deadlines. If, however, no substitutes appear on the immediate horizon, then the agency will be able to adopt a phase-out approach. A phase-out period significantly reduces the economic impact of banning a substance or activity; it provides time for substitutes to be developed, and it allows companies to shift production away from the banned product. The agency must be aware, however, that scientific and political circumstances may change in a manner requiring an extension of the phase-out period. It is always easier to extend a phase-out period than it is to shorten one. The emergence of the blender industry in the midst of the EPA's lead phase-down proceedings is a good example of what can happen when the agency is too eager to extend deadlines.[70]

However, radical technology-forcing is not appropriate in all environmental contexts. It will not work when an environmental problem has complex causes—for example, dissolved oxygen in heavily used rivers—that cannot be addressed by banning a single substance or activity.

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68. La Pierre, *supra* note 7, at 837-38.

69. *See, e.g.*, CAL. HEALTH & SAFETY CODE § 43,013 (West 1986 & Supp. 1994); ILL. ANN. STAT. ch. 415, para. 5/27 (Smith-Hurd 1993); IOWA CODE ANN. § 455B.133 (West 1990 & Supp. 1993).

70. *See supra* part II.B.

It is best adapted to situations in which a single substance or activity is causing particular environmental problems.

The approach is also risky when the consequences of the failure to inspire technological innovation are very high. For example, despite efforts by environmentalists in the early 1970s to ban the internal combustion engine, Congress and the EPA were unwilling to risk the turmoil that would have resulted if automobile manufacturers had failed to come up with a suitable engine for passenger vehicles. The approach is best suited for the opposite situation in which the consequences of not taking any action are relatively severe.

Finally, the EPA's experience with asbestos suggests that an agency should be reluctant to rely upon radical technology-forcing when there is a serious question about whether its statutes authorize it to adopt that approach. Not only are American courts reluctant to Putney Swope activities in common-law nuisance cases, they are also reluctant to allow federal agencies to Putney Swope things without congressional blessing. Courts will probably carefully examine the agency's legal authority to adopt that approach, and will certainly take a "hard look" at the scientific and technical basis for the agency's action.

Although the Putney Swope approach is not a universal solution to the problem of regulating activities that pose a threat to the human environment, it should be a more often used weapon in the regulatory arsenal. The Putney Swope approach is responsible for some of the clearest environmental success stories. The agency that would adopt a radical technology-forcing approach must have courage and imagination. It must have the flexibility to extend the deadlines when the facts prove that it is being overly optimistic, but it must sternly resist attempts by the regulated industry to avoid change through artful brinkmanship. In short, the agency must carefully seek out situations in which a major disruption of an unacceptable status quo will lead to a better future.