RISK: Health, Safety & Environment (1990-2002)

Volume 4
Number 3 *RISK: Issues in Health & Safety*

Article 4

June 1993

Toxics Use Reduction: Pro and Con

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Introduction

Toxics Use Reduction (TUR) is a new strategy for pollution prevention that has gained a great deal of attention on both the state and federal level. As pollution prevention has emerged as the preferred method of protecting the environment,[1] TUR has been advocated as a simple and effective method of reducing toxic pollution. Proponents maintain that TUR gets the job done without the time consuming processes of quantitative exposure and risk assessment and without extended administrative procedures for standard setting.[2]

Up to now, there has been little dialog about, or critical examination of, TUR. Most discussion has simply involved advocates endorsing the strategy wholesale and opponents arguing that TUR is at best worthless, at worst pernicious. These positions are usually presented in periodicals for at like-thinkers; rarely do the public, the government community or academics see the promise and problems of TUR presented in a single forum. This paper aims to bring together these differing opinions and examine the pros and cons of the TUR strategy.

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1 EPA has endorsed pollution prevention as the primary strategy for dealing with wastes. *See* F.Henry Habicht, *Prevention in the 1990s*, 23 POLLUTION ENG. 11 (1991).

2 Ken Geiser, Director of the Massachusetts Toxics Use Reduction Institute has written about TUR laws: "These new laws bypass debates over acceptable levels of toxicity and the risks of specific exposure levels or releases. They rest on a simple argument: the use of every toxic chemical should be reduced or eliminated." Ken Geiser, *The Greening of Industry: Making the Transition to a Sustainable Economy*, Technology Review, Aug./Sept. 1991, at 64.

First, the definition and scope of TUR are discussed using the Massachusetts Toxics Use Reduction Act (MA TURA) as an example. Next, the basic philosophy behind TUR, and the philosophy motivating its opponents are discussed. Then, various important issues related to the goals and effectiveness of TUR are examined. In this section the benefits of TUR that are claimed by proponents are contrasted with the postulated shortcomings and failings outlined by the opponents. This debate is presented in a point/counterpoint style. We conclude with a call for a reasoned examination of the promise and problems of TUR.

What is TUR?

TUR is a pollution control strategy that falls under the rubric of pollution prevention.[3] It aims to reduce pollution through a decrease in the actual use of hazardous and toxic chemicals. The MA TURA defines TUR as "in plant changes in production processes or raw materials that reduce, avoid or eliminate the use of toxic or hazardous substances or generation of hazardous by-products per unit of product, so as to reduce risks to the health of workers, consumers or the environment, without shifting risks between workers, consumers, or parts of the environment."[4] Although "risks" are important to MA TUR, there is no mention of how they are to be determined.

Since 1989, TUR has become prominent in environmental legislation. At least twelve states currently have environmental laws with some form of TUR provisions.[5] These are either pure TUR laws or are combined with hazardous waste management laws. Proponents of TUR are also trying to get the strategy incorporated into federal legislation.[6] So far none of this legislation has been passed, but many

[3] There may be as many definitions of TUR as there are proponents of the idea, ranging from TUR as a synonym for pollution prevention to TUR as a strategy to ban toxic chemicals. For a discussion of some different definitions, *see* Harry Freeman et al., *Industrial Pollution Prevention: A Critical Review*, 42 J. AIR & WASTE MGMT. ASS'N 618 (1992).

[4] Massachusetts Toxics Use Reduction Act, MASS. GEN. L. ch. 211 § 2 (1989) (hereafter MA TURA § xx).

[5] Waste Reduction Institute for Training and Applications Research (WRITAR), Inc., State Legislation Relating to Pollution Prevention, WRITAR, Inc., Minneapolis, MN (Apr. 1992). In addition, fourteen states have source or input reduction statutes.

in the environmental arena believe that TUR will be a focus of future environmental legislation.

The Massachusetts Act

The MA TURA, one of the first TUR statutes, serves as a good example with which to illustrate TUR laws. This act has served as an example for later laws, specifically New Jersey TUR[7] and the Sikorski Right-to-Know-More Bill.

The MA TURA reflects compromises between the environmental community (led by the state Public Interest Research Group, i.e., MASSPIRG) and the business community (led by the Associated Industries of Massachusetts (AIM)). It is believed, however, that the business community came to the table only because they were faced with a TUR ballot referendum perceived as extremely severe. Accepting that some form of TUR was inevitable, they concentrated on getting a bill acceptable to AIM. MASSPIRG had previously won an initiative petition to amend the state superfund law. In this case, it was more interested in securing a consensus bill and getting TUR on the books than in proving that it could win a referendum by offering voters a full strength version of the bill.[8]

The goal of the MA TURA is, as stated in the Act, "to achieve by 1997, through TUR, a 50% reduction from 1987 quantities of toxic or

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6 In 1992, TUR was an important part of S.1076 (reauthorizing the Resource Recovery and Recycling Act) and S.1081 (reauthorizing the Clean Water Act) presented by Senator Baucus of Montana in the 102d Congress, 2d session. *See also,* Resource Conservation and Recovery Act Amendments of 1992, S. 976, 102d Cong.; 2d Sess. in REPORT OF THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS, S. REP. NO. 301, 102d Cong., 2d Sess. (1992) (Hereafter RCRA Amendments Report).

TUR was also incorporated to a great extent into the Right-to-Know-More Act, H.R. 2880, presented by Representative Sikorski of Minnesota to the House of Representatives as an amendment to the Solid Waste Disposal Act. *See, e.g.,* GENERAL ACCOUNTING OFFICE, TOXIC SUBSTANCES: ADVANTAGES OF AND BARRIERS TO REDUCING THE USE OF TOXIC CHEMICALS: REPORT TO THE HONORABLE GERRY SIKORSKI, HOUSE OF REPRESENTATIVES (1992) (Hereafter GAO).

7 The NJ and MA acts are considered the strongest TUR statutes by most environmentalists; personal communication from Dr. Manik Roy, Environmental Defense Fund.

8 *Massachusetts developments: Toxics reduction law: The goal was "workability"* in Massachusetts Waste Management Report (MWMR), Hazardous Waste And Related Issues, Aug. 1989, at 1, 5.

hazardous by-products generated by industry in the Commonwealth of Massachusetts."[9] Toxic compounds are defined in a list that initially consisted of all the chemicals on the Emergency Planning and Community Right to Know Act (EPCRA) Toxic Chemical List, Title III, § 313 of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This is the Toxics Release Inventory (TRI) list and contains approximately 300 chemicals. As of January 1, 1991 a schedule covering 1991–93 was established for adding the compounds listed in §§ 101(14) and 102 of the Comprehensive Emergency Response, Compensation and Liability Act of 1980 (CERCLA), the Superfund law, bringing the total number of chemicals on the toxics list to over 1000. After 1994, the Administrative Council in Toxics Use Reduction, in consultation with others, will have authority to add or delete up to ten chemicals per year.[10]

Each industrial facility under certain Standard Industrial Classification (SIC) codes[11] must develop plans for reducing the use of listed chemicals, if the facility's use or release of the chemical exceeds the TRI annual threshold. The plans must be approved by state certified TUR planners (TURPs); summaries are filed in the Department of Environmental Protection (DEP) and are available to the public upon request. Although implementation of the plans is not mandatory, firms must report their progress toward TUR goals annually. Residents living within ten miles of a facility may petition for DEP to examine the plan and determine its adequacy.[12]

The law also sets up the Toxics Use Reduction Institute at the University of Massachusetts, Lowell.[13] It is responsible for training TURPs and pursuing research on TUR methodologies.

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9 MA TURA § 6(1).
The contrast between the title of MA TURA, which emphasizes use reduction, and the language of the act, which mandates waste reduction, is a continuing source of friction between industry and TUR advocates in Massachusetts.

10 MA TURA § 9.

11 SIC codes 10–14 cover mining; 20-39 manufacturing; 40, 44–49 transportation; 50-51 wholesale; 72,73,75, and 76 certain services. [These codes are assigned by the Department of Commerce.]

12 MA TURA § 18(B).

13 MA TURA § 6.

The MA TURA accepts six methods to achieve TUR: (1) input substitution; (2) product reformulation; (3) production unit redesign or modification; (4) production unit modernization; (5) improved operation and maintenance of production unit equipment and methods and (6) recycling, reuse or extended use.[14]

Under the act, input substitution occurs when "toxic" raw materials on the list are replaced with "non-toxic" or less toxic materials not on the list. Product reformulation means substituting for an existing end product with an endproduct which is nontoxic or less toxic upon use, release, or disposal. Production unit redesign, modification, or modernization comes under TUR when changes in the manufacturing process and/or equipment via upgrading or replacement, allows for the reduction in use of toxic materials or feedstocks. Improved operation and maintenance of production unit equipment and methods refers to modifying or improving existing equipment and methods. Improved housekeeping practices, system adjustments, product and process inspections or production unit control equipment or methods are some acceptable techniques. Recycling is part of TUR only when it is a closed loop, integral part of a process. Thus potential wastes or their components are returned for reuse within existing operations or as part of other production processes.

TUR specifically does not include incineration, release or discharge into the environment, off site or out of production unit waste recycling, or methods of end-of-pipe treatment of toxics as waste.[15] All of these are end-of-the-pipe strategies, dealing with waste products after they have been created. They are considered less desirable because they do not address the reduction of front-end toxic use.

Why We Need TUR

Proponents of TUR, mainly public interest groups and to some extent U.S. EPA and state environmental protection agencies, believe that there is a real need for TUR legislation. The motivation stems from

14 MA TURA § 2.

15 *Id.*

the arguments put forth for pollution prevention — change the emphasis of pollution control from single medium end-of-the-pipe controls[16] to multimedia, whole-process strategies. In this way, it is believed, the creation of wastes can be reduced or eliminated instead of being controlled or reduced after the fact. The philosophy behind TUR can be summed up in three points.

• *Less of a bad thing is a good thing*

The basic premise behind the push for pollution prevention laws in general, and TUR laws in particular, centers around the definition of the word prevention. Literally, if pollution is prevented in the first place there will be less of it to be dealt with later. Reducing the use of toxic chemicals in a process, it is reasoned, will directly result in decreased emissions during the manufacturing process and at the end of the pipe. Additionally, by reducing the use of raw materials, resources are conserved and the energy used to make them is saved.

• *Less use means less recycling, treatment, and/or disposal*

Proponents of TUR argue that the solutions emphasized by traditional environmental regulation, recycling, treatment and disposal, have many associated problems.[17] Wastes often have to be handled, stored and transferred to different facilities. Emissions and/or accidental spills expose workers and the general public to hazardous chemicals. Furthermore, additional toxic chemicals are often used in the waste treatment process. Although recycling is commonly the preferred form of waste management, emissions can enter the environment as a direct result of the recycling process itself. Recycling plants may also cause problems after they cease operation. Approximately 100 such facilities are on the EPA's National Priority List (NPL) of Superfund Sites.[18] There are also potential exposures to toxic chemicals associated with landfills and other disposal facilities. It is believed that less use of toxic chemicals will help to reduce all of these problems.

16 Current environmental laws, and even the structure of the EPA, is based on statutes governing one medium such as the Clean Air Act, the Clean Water Act, or RCRA covering land disposal.

17 *See e.g.*, Manik Roy & Hillel Gray *Toxics Use Reduction: The Critical Issues*, 2 POLLUTION PREV. REV. 181 (1992) and Geiser, *supra* note 2.

18 E. Shenkman, *Right-to-Know More,* 7 ENV. FORUM 21 (1990).

• *Whole facility, multimedia approach*

Unlike traditional end-of-the-pipe legislation, pollution prevention and TUR promote a whole facility, multimedia approach to pollution control.[19] Total emissions and releases from a facility are regulated under one act as opposed to separately according to the media (water, air, or land) into which they are emitted. The advantage of this approach is that it brings together all the different players, such as regulators, engineers, public relations people, marketing people and managers, and gives them a common language with which to communicate. The whole facility approach also makes it easier for both a plant manager and a regulatory decisionmaker to keep track of all of the wastes entering the environment. Therefore, the total effect of new decisions on pollution prevention, as opposed to the impact on only one environmental media or on one part of the plant, can be considered at once. This approach may also lead to cost savings by reducing the need for expensive end-of-the-pipe pollution control technology. In this way the wastes and emissions will be reduced most efficiently without allowing the transfer from one media to another or between the environment, the workers and the consumers.

TUR laws are also seen as a way to encourage companies to examine their use and emissions of chemicals in process and production planning. As an example, proponents argue that although source reduction (a close cousin of TUR)[20] is in the best interest of companies, few firms look for opportunities to reduce their use of toxic materials on a facility wide basis. Dr. Warren Muir, a senior fellow at INFORM, in testimony before the U.S. Senate Environmental Protection Subcommittee said:[21]

> One of the main reasons industrial facilities are falling short of their source reduction potential is that they are unaware of their sources (i.e. the specific places in their processes and activities giving rise to material losses). INFORM has found

[19] *See* Gieser, *supra* note 2; and R. Reibstein, *Toxics Reduction: TURA, An Environmental and Economic Plan for the Future,* Industry, Mar. 1991, at 15.

[20] Roy & Gray, *supra* note 17.

[21] RCRA Amendments Report, *supra* note 6.

> that virtually every facility that carefully looks at its operations finds significant opportunities for source and toxic use reduction. Therefore, anything the government can do to stimulate companies to take a look at what they otherwise wouldn't should promote significant source reduction progress.

Advocates believe that the preparation of TUR plans is the incentive that firms need to look more closely at use and emissions of toxics in their production processes.

Do We Need TUR?

The information discussed below illustrates the basics of the arguments presented by the opponents of TUR, primarily the manufacturers and users of chemicals on the TUR list. Their main concern is that the mandatory aspects of the law soon will include not just development of TUR plans, but their implementation as well. In addition, they fear that TUR will lead to bans and phaseouts of the use of specific chemicals.[22] Industry claims to be very supportive of pollution prevention, the idea of eliminating wastes before they occur, and sees TUR as simply one of many tools for reducing pollution. They feel that by focusing the emphasis on TUR, and by not addressing risk, resources will be misallocated and pollution prevention will not occur efficiently.[23] Opponents have three major concerns about mandatory TUR as a pollution prevention strategy.

• *Other Laws*

One of the arguments presented against TUR laws is that they are redundant considering other environmental laws that are already on the books. Among its goals, TUR is supposed to ensure worker safety; decrease the risks associated with transportation accidents and disposal and treatment of hazardous wastes; limit the use of "dangerous" chemicals; and increase the public's right to know about toxic chemical use. However, the Occupational Safety and Health Administration

[22] In one of the early drafts of MA TURA, bans and phaseout language was included; Massachusetts Toxics Use Reduction Act § 11 (Draft July 8, 1987).

[23] K. Rademaker, *Toxics Reduction: A Matter of Choice*, Occupational Hazards, Mar. 1992, at 54.

(OSHA) is already responsible for regulating workplace exposure to hazardous chemicals. The Hazardous Materials Transportation Use and Safety Act covers transportation risks. Disposal and cleanup are controlled and regulated under the Resource Conservation and Recovery Act (RCRA) and CERCLA. Under the Toxic Substances Control Act (TSCA), EPA is already responsible for evaluating health and environmental effects of chemicals. SARA Title III, the Emergency Planning and Community Right to Know Act (EPCRA), requires release reporting, thus informing citizens about the use of toxics in their communities. The Pollution Prevention Act (PPA) of 1990 expanded these reporting requirements to include information on recycling, source reduction practices and amounts of chemicals in the waste stream prior to pollution control measures. Opponents argue that the goals of TUR duplicate existing laws.[24] TUR is simply an attempt to bypass the normal regulatory process.

• *TUR Ignores the Benefits of Toxic Chemicals*

The basic premise behind TUR is that the risks associated with toxic chemicals outweigh any benefit associated with their use. Implicitly this idea assumes that in a risk/benefit analysis the use of these chemicals would be assigned a benefit of zero. However, industry is not using these chemicals merely because they are "toxic," but because they work. Synthetic chemicals by definition did not just exist. Many were created for a purpose and are, in most cases, still used today because they effectively, under current technological know-how, get the job done. The toxic chemicals usually discussed by TUR proponents are those used as end products, chiefly solvents and cleaners. However, six of the eight organic chemical building blocks, from which many other chemicals and synthetic products are made are listed as toxic.[25] These are butadiene, benzene, ethylene, propylene, xylene and toluene. They are necessary for making many useful non-hazardous products and cannot easily be replaced. For example, the manufacture of many

[24] Joe Maty, *Toxic Use Reduction Called Threat to Competitiveness*, American Paint and Coatings Journal, Dec. 1991, at 11.

[25] CHEMICAL MANUFACTURERS ASSOCIATION, FACTS ABOUT TOXIC USE REDUCTION (TUR) LEGISLATION: H.R. 2880, S. 2123, S. 761, S. 976, S. 1081 (Mar. 1992, updated May 1992) (hereafter CMA).

recreational products such as golf balls, camping and hiking equipment and compact discs also depend on these chemicals. Furthermore, some of these chemicals are important raw ingredients of many over-the-counter pharmaceuticals.[26] The way TUR laws are written now, all uses of these chemicals are treated the same. There is no room for assessing the benefits associated with the specific use of the chemical.

• *Unnecessary Government Intrusion into Business*

Finally, industry claims that TUR is leading towards a "big brother" society in which government is telling manufacturers how and with what to make their products, and even what products they can make. They feel that reducing use of toxics should be a voluntary activity taken because it is the most appropriate or efficient method to reduce pollution. The EPA-sponsored 33/50 program is one such activity that has had positive reviews by industry.[27] As of 1991, 300 companies have volunteered to develop plans to reduce their releases of seventeen targeted industrial chemicals 33% by 1992 and 50% by 1995.[28] The chemicals were selected from recommendations submitted by all of EPA's program and regional offices, based on health and ecological risk, potential for multiple exposures or cross-media contamination, technical or economic opportunities for prevention, and limitations of treatment.[29] Individual companies have also set up their own pollution prevention programs. In 1975, 3M established its 3P program (Pollution Prevention Pays). It advocates pollution reduction or prevention through product reformulation, process modification, equipment redesign and resource recovery. Significant economic benefits have been realized.[30] Dow Chemical has the Waste Reduction Always Pays Program (WRAP), which rewards plants that develop innovative waste reduction plans. In 1991, 13 million pounds of wastes

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26 *Id.*

27 Gerald F. Kotas, *Pollution Prevention: What's Been Accomplished*, 23 POLLUTION ENG. 13 (1991).

28 EPA SPECIAL PROJECTS OFFICE, THE 33/50 PROGRAM: FORGING AN ALLIANCE FOR POLLUTION PREVENTION (1991).

29 Gerald F. Kotas, *Charting the Pollution Prevention Course*, 23 POLLUTION ENG. 13 (1991); and EPA 1991 *supra* note 16.

30 J. Redman, *Pollution is Waste*, 461 CHEM. ENG. 16 (1989).

were eliminated and $10.5 million was saved through WRAP.[31] Du Pont also has been voluntarily working to minimize its waste stream under its ReSource program.[32] In addition to individual initiatives, all of the members of the Chemical Manufacturers Association (CMA) are pledged to the Responsible Care program. Responsible Care establishes six codes of management practice intended to protect humans and the environment from improper use of chemicals: community awareness and emergency response; pollution prevention; process safety; distribution; employee safety and health; and product stewardship.[33] These examples indicate that pollution reduction is a primary concern for industry — and an area in which it has been making progress on its own. Proponents of TUR feel that the action has been too slow and further regulation is therefore necessary.[34]

The Debate

Here we address some of the most controversial issues that arise in the TUR debate: chemical accidents, economics, substitution and use-versus-risk. Proponents of TUR are making strong claims about the advantages of TUR in these areas. On the other hand, the opponents are arguing either that TUR is not the appropriate solution to these problems or that the law may be responsible for making the situation worse. The debate is presented in a point–counterpoint style, i.e.,what proponents and opponents say respectively, for each issue.

Chemical Accidents

• *Point*

Every year, many transportation accidents release toxic chemicals. This causes numerous hardships. For example, in February 1990, a train in Montana released toxic chemicals forcing 3,500 people to evacuate in severe winter weather.[35] A Texas pipeline carrying toxic

31 American Paint and Coatings Journal, Dec. 1991, at 10; and Mike Buetow, *Design for Recycling*, Jan. 6 SURFACE MOUNT TECH. 5 (1992).

32 Redman, *supra* note 30, the term indicates Source Reduction.

33 Responsible Care was adopted by the CMA in 1988.

34 J.D. Smith, *Toxics Use Reduction: Prudent or Pernicious?*, Environment and Industry Digest, Feb. 1992, at 6.

chemicals leaked in October 1989, causing an explosion that killed 23 people and resulted in significant property damage.[36] Reducing the use of toxic chemicals, and the need to transport them, would decrease the risk of injury, health hazards, property damage and legal liability.

Occupational accidents would also be less frequent. One paper illustrates how serious the risks of industrial accidents are:[37]

> The EPA established the Acute Hazards Events Data Base specifically to track [chemical] accidents with the potential to have resulted in deaths, injuries or evacuation. For the period from 1982 to 1986, the Data Base recorded an average of 2,070 such accidents each year; of which 112 involved one or more persons being killed, and 968 involved one or more persons being injured. Altogether, 288 persons died in these accidents and 10,803 injuries occurred.

Proponents of TUR argue that reducing the use of toxics in the workplace will decrease these numbers. In addition, many believe that the dangers from use-related hazards, such as transportation accidents and worker exposure, probably exceed the end of pipe emission risks to the general public.[38]

• *Counterpoint*

Critics of TUR argue that OSHA, EPA, FDA and other government agencies already have responsibility for ensuring worker, community and consumer safety. TUR opponents maintain that dissatisfaction with the scope and pace of regulation by these agencies does not justify an end run around them. Many of the enabling laws for these agencies require the evaluation of risks and benefits or feasibility. It may be that what TUR proponents see as insufficient action is due to agency analyses indicating that the benefits of the activity in question outweigh the costs of abatement. Opponents, therefore, see TUR as bypassing the environmental analysis required by current laws.

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35 GAO, *supra* note 6.

36 *Id.*

37 GEOFFREY LOMAX, MARC OSTEN & WILLIAM RYAN, TOXIC TRUTH AND CONSEQUENCES: THE MAGNITUDE OF AND THE PROBLEMS RESULTING FROM AMERICA'S USE OF TOXIC CHEMICALS, 2 (Nat. Env'l Law Center and US PIRG 1991).

38 Roy & Gray, *supra* note 17.

There is also question about whether TUR really can effectively decrease transportation accidents and the dangers associated with them. If, by reducing the demand for a "toxic" chemical, fewer trips from the producer to the user are necessary, then TUR will likely be successful. However, if the train merely has one less tank car, or the pipeline has 10% less chemical running through it, will the risk of exposure really be decreased? This is a question that is amenable to empirical research.

Economics

• *Point*

Proponents argue that not only is TUR a health protective measure, but it also makes good economic sense.[39] By using less of a given chemical, fewer resources will be spent. Companies will save on raw materials and energy, either through process changes or through substitution.[40] One frequently cited example of a cost saving is in solvent use. In many cases common organic solvents can be replaced, often with soap and water, leading to a cost savings as well as a likely decrease in toxicity.[41] For example, Riker Laboratories in California saved at least $15,000 annually by replacing organic solvents with water based solvents for coating medicine tablets.[42] Chevron, in a Kentucky facility, made substitution and process changes eliminating the generation of hazardous waste paint residues, caustic oil and water mixtures and allowing resource recovery of cleaning water. Savings totaled $80,000 per year and productivity was increased by 200%.[43]

39 Reibstein, *supra* note 19; Roy and Gray, *supra* note 17.

40 RCRA Amendments Report, *supra* note 6.

41 It is not clear that the replacement of solvents with aqueous cleaners is always preferable. A study jointly sponsored by the Metropolitan Water District of Southern California and the Environmental Defense Fund found that the high energy requirements for aqueous based cleaning made its superiority less clear at the level of an individual facility. At a global level, it was found, aqueous cleaners probably are desirable. Potential for Source Reduction and Recycling of Halogenated Solvents, A Report on Research Performed by the Source Reduction Partnership for Metropolitan Water District and the Environmental Defense Fund, Environmental Defense Fund, New York, NY (1992)

42 MASSPIRG, TOXICS USE REDUCTION: FROM POLLUTION CONTROL TO POLLUTION PREVENTION (1988).

43 *Supra* note 30.

Anticipating one argument of TUR opponents, advocates argue that even if substitute chemicals are more expensive, it is possible that the increased initial costs are only temporary, merely a function of the fact that the technology is new or little used. As the substitute becomes more prominent and accepted, costs are likely to decrease.

Not only will the immediate costs of purchasing the chemicals be reduced, but so will the subsequent disposal costs. It is often less expensive not to produce toxic hazards in the first place than it is to pay the costs of handling and disposal. There are many examples of significant cost savings of this sort. Riker Laboratories saved $180,000 in pollution control equipment costs by making the switch mentioned above.[44] Briggs and Stratton Corporation of Wisconsin saved $312,000 per year in environmental compliance costs by substituting a water-based cleaner for trichloroethane in parts cleaning.[45]

Also, costs associated with complying with other environmental laws may be decreased. By reducing the use of "toxics" that lead to hazardous releases less money and fewer resources have to be spent on complying with the Clean Air Act (CAA), the Clean Water Act (CWA), RCRA, TSCA and Superfund. Less money would have to be spent on waste treatment technologies and on liability costs. Liability costs are particularly troublesome to businesses because they are so difficult to predict. Disposal practices that are acceptable today may not be tomorrow. If less toxic material is to be disposed of, costs will decrease.

Not only can TUR save the company money, it may also help in the market-place. Many companies have found that being able to claim that they are helping the environment and contributing to public health gives them a significant competitive edge. Consumers take these claims very seriously and appear to prefer "green" products. Chemical manufacturing companies and others are citing their environmental record extensively in advertising campaigns. American Cyanamid of Ohio replaced cellosolve acetate, a chemical on the list of toxic

44 *Supra* note 39 and discussion.

45 Lynn Vendinello, *EPA Targets Pollution Prevention,* 24 POLLUTION ENG. 27 (1992).

compounds, with ethylene glycol diacetate, which is not on the list. The primary motivation for the change was to increase the marketability of their product by eliminating the hazardous label.[46]

• *Counterpoint*

Opponents of TUR say that it is not at all clear that TUR makes good economic sense, pointing out, for example, that substitution costs will not always be lower. As a case in point, there has been widespread substitution of chloroflourocarbons (CFCs) with hydrochloroflourocarbons (HCFCs) in the refrigeration industry. Currently HCFCs are significantly more expensive, approximately $11.00 per pound versus $0.60 for CFCs.[47] Furthermore, major capital investments or production process changes may be required to accommodate material substitution. The start-up costs for substitution might be more expensive than it is worth, even over the long term. Currently, there are few, if any, examples in the literature of cases where TUR ended up costing a company significant amounts of money. However, because TUR laws are new and most activity has been voluntary, it may be that the present literature is biased towards success stories.

There are also significant research and development costs and opportunity costs associated with TUR. Companies have to invest their resources in finding out if there is another feasible way to do what they are already doing. This is an especially large concern for smaller firms, which may not have the research or engineering resources to devote to TUR. Because of this concern, provisions in the MA TURA created the Office of Technical Assistance (OTA).[48] OTA is intended to act as a clearinghouse for TUR methodologies and technologies. In this way, smaller firms can take advantage of advances in TUR strategies without large costs. For any firm, meeting TUR requirements can take time and money away from improving existing products and developing new ones. Opponents claim that TUR is essentially government telling

[46] MARK H. DORFMAN, WARREN R. MUIR & CATHERINE G. MILLER, ENVIRONMENTAL DIVIDENDS: CUTTING MORE CHEMICAL WASTES (INFORM, Inc. 1992).

[47] Matthew L. Wald, *Supermarkets Experiment with Ozone-Saving Coolant,* New York Times, Mar. 24, 1992, at D1.

[48] MA TURA § 7.

industry where to spend its R&D money. Also, these companies' present capital investments in pollution control may become obsolete.

Although proponents of TUR see it as providing its participants with a competitive edge, opponents of the law argue otherwise. They foresee problems in the national market if TUR remains a state level regulation and problems in the international market if it is passed on the federal level. If one state has stricter regulations than another, companies may choose to build their plants in the more lenient location. Companies may move out of the country altogether if they consider a Federal law too strict. These relocations would affect jobs and, therefore, the local economy. Additionally, the costs of TUR, due to the cost of substitute chemicals or new machinery for example, may be so high that the products cannot compete on the international market.

Opponents also claim that TUR will affect product quality. Production changes, especially substitutions, can lead to suboptimal products due to inferior performance of the substitute, and overseas competition could gain an advantage on quality, as well as price.[49]

Another concern in this debate is the effect TUR might have on trade secrets. The extensive reporting requirements required by the law may threaten privileged information, such as ingredients and their amounts and production processes. Competitors might be able to use this information to improve their own products. For example, there have been reports of foreign competitors using environmental reporting data in order to learn trade secrets for reverse engineering activities.[50] The General Accounting Office reports that 40% of requests for toxic release inventory information come from other companies, as opposed to public interest groups or the general public.[51]

TUR laws are sensitive to this problem and have set up mechanisms for dealing with it. Companies can file for trade secret claims about specific details of the manufacturing processes. If they can show that disclosure of the information is likely to cause substantial harm to their

49 Maty, *supra* note 24.

50 Smith, *supra* note 34.

51 GAO, *supra* note 6.

competitive position, the crucial information will be blocked out in any documents available to the public. Industry remains concerned about this aspect of TUR, however, in practice trade secret claims are rarely made. The State of New Jersey requires use data on a facility-wide basis as part of their right-to-know program. Only three trade secret claims have been made over the last three years.[52] Under MA TURA, Massachusetts collects both facility-wide and process-level-specific reporting on toxic chemical production use. In the first year there were only six trade secret claims in 600 reports.[53] However, these numbers may be due to burdensome requirements for documenting the need for trade secret protection, particularly for small, resource limited companies.

Substitution

• *Point*

As one of the primary methods of achieving TUR, substitution is a cornerstone of the TUR strategy. The purpose of substitution is to reduce and ultimately to eliminate the use of "toxic" chemicals by replacing them with "safe" chemicals. Under TUR the list is used to determine whether a given chemical is "toxic" or "safe."[54] There may

52 Roy and Gray, *supra* note 17.

53 *Id.*

54 The use of a list, as well as the makeup of the list are also very controversial subjects. Proponents argue that the advantage of using the list approach in regulatory legislation is that it is easy and straightforward. It is obvious and nondebateable when you are on or off the list. The advantage of using lists such as SARA Title III and CERCLA is that they already exist. The chemicals on these lists are generally accepted as having potential for adverse effects. However, opponents believe that there are disadvantages to using a list, in general, and these existing lists in particular. The list approach separates the world of chemicals into "toxic" and "safe," often arbitrary distinctions that do not allow for evaluation by use. In addition, a list does not take into account the exposure associated with specific uses.

There also is debate over the particular list used in TUR. Specifically, there is no consistency in the toxicity criteria used to evaluate chemicals in the current TUR list. The SARA Title III list was made up of lists of hazardous and toxic substances used in New Jersey and Maryland. These two states had the most extensive lists of industrial-use chemicals at the time that the TRI was being created. Chemicals were included based on toxicity and the amount produced in the given state. The criteria used to determine toxicity is not entirely clear, nor is the relative importance given to use versus toxicity in generating the list. Therefore, there are widely varying degrees of toxicity within the list. Grouping these chemicals together prevents risk reduction through the replacement of a chemical on the list with a less toxic chemical that is also

be disagreements about which chemicals should be on the list, but ultimately, proponents argue, this simple, straightforward approach to substitution will encourage TUR.

• *Counterpoint*

Several problems with substitution are cited by opponents of mandatory TUR. First, they argue that often few or no feasible hazardous substitutes substitutes exist. As mentioned earlier, many toxic chemicals are building blocks for a wide range of products. According to the CMA, it is just not feasible to replace benzene with a "safe" chemical to make aspirin. Using less benzene will, therefore, simply lead to less aspirin and higher prices. CMA asserts that this situation will affect thousands of useful and valuable consumer products from kidney dialysis tubing to compact discs.

Opponents of TUR, as well as some proponents, argue that the most serious problem that could arise from widespread promotion of substitution is unacknowledged risks associated with a new chemical. Toxicologists hold as a central tenet of their discipline that the dose makes the poison, and dose determines safe versus unsafe substances. Both table salt and cyanide can kill a laboratory rat; the difference is that a much smaller dose of cyanide is lethal. From this premise it is obvious that any substitute chemical also can be toxic. Thorough testing will surely reveal that many chemicals not on the list are also toxic. By setting up a false dichotomy of "toxic" and "safe" we may lead to both unfavorable outcomes, with adverse health effects caused by "safe" substitutes, and public cynicism about scientific knowledge.

A recent example of the possible health risks of "safe" substitutes comes from the semiconductor chip manufacturing industry. Many firms in the industry, in a search for alternatives to ozone depleting CFCs, turned to two solvents which were touted as safe. However, a recent study found elevated rates of miscarriage among female workers exposed to these chemicals.[55] Many experts are concerned that rapid

on the list. Opponents also argue that changes in the list make planning for the future very difficult, a substitute chemical which is "safe" this year could end up on the list next year.

[55] John Markoff, *Miscarriages Tied to Chip Factories: I.B.M. Finds a Chemical Risk for Some Women Workers,* New York Times, Oct. 12, 1992, at A1.

change in manufacturing processes or materials will not allow for the thorough testing required to reveal adverse health effects.

Not only would process engineers be making decisions without adequate information about health risks, they also need to be concerned with the tradeoff between risks. Substitution may result in a trading of cancer risks for workplace hazards such as flammability and corrosivity. For example, Aristech, a chemical manufacturer in Ohio, substituted Safety-kleen solvent for Dowclene. Dowclene was classified as hazardous by the Ohio EPA because it contained 1,1,1 trichloroethane. The results were a 100% reduction of Dowclene in the wastewater. However, Safety-kleen is highly flammable,[56] so work areas had to be modified for greater ventilation in order to reduce worker safety risk.[57]

It is also possible that more pollution will be associated with substitution. If the "safe" chemical is less effective at a particular function than the original, it may be necessary to use more of it, thereby potentially increasing pollution and risks. Furthermore, toxic chemicals in use today are usually closely monitored and disposed of, because of both legal obligations (e.g. RCRA) and for liability reasons. Substitute chemicals will not be subject to the same scrutiny and may not be treated as carefully.

Use Versus Risk

• *Point*

Proponents of TUR argue that there is a direct relationship between the use of toxic chemicals and the risks associated with them. If one uses less of a toxic chemical then there will be less risk associated with handling both the raw materials and the final product. In addition, TUR makes things happen. There is no delay or litigation over risk assessment or appropriate levels for standards. No time and money is wasted waiting for government, scientists and risk assessors to determine what methods, assumptions, parameters and uncertainty factors to use. Public interest groups often consider risk assessment a

56 One of the reasons that 1,1,1-trichloroethane was used originally is its low flammability.

57 Dorfman et al., *supra* note 46.

stalling tactic used by industry and see TUR as a way to take back the initiative in environmental protection.

• *Counterpoint*

On the other hand, opponents of TUR argue that it is important to realize that use of a toxic chemical does not equal exposure. Many manufacturing and production processes use chemicals in ways that minimize or avoid human exposure. Also, many final products made from "toxic" chemicals are nontoxic and pose no risk to consumers related to toxic chemicals because there is no exposure. Not only is the relationship between use and exposure suspect, but even when there is exposure, the associated risks may be negligible (without risk assessment, it is difficult to tell). Therefore, money and effort spent to reduce use will have little effect on risk reduction.

From the success stories presented by proponents, it is clear that solvents are particularly effective as a target for TUR. When a solvent is used as a cleaner and not incorporated into the product, 100% of it becomes waste. If it is replaced, the waste associated with it is entirely eliminated. However, these success stories have little real impact on environmental protection because solvents do not represent a significant part of the toxic waste stream. Less than 1% of the chemicals used by U.S. industry are solvents.[58] Therefore, a great deal of money and attention is directed to a minor portion of chemical use. A further problem cited by opponents is a lack of room in TUR for weighing and comparing risks; alternative chemicals may have more potential for human exposure than the chemicals that they replace.[59]

Finally, although the goal of MA TURA, as stated earlier, is to reduce, by 50%, the amounts of toxics or hazardous by-products generated by industry, there are many different scenarios in which this goal may be met. The use of different chemicals may be reduced in different combinations. However, the risk reduction achieved by each scenario might be very different. A large reduction in a mildly dangerous chemical on the list while the use of a highly toxic chemical is

58 Smith, *supra* note 34.

59 E.g. due to physical properties such as volatility or the amount required for a particular use.

unchanged or increases, will achieve the goal of TUR but will do little to protect people from the real risks to their health. Without considering exposure, and, consequently, risk, real opportunities for risk reduction cannot be determined and regulators and the public will have no idea how much TUR has achieved.

Conclusion

TUR as a pollution control strategy is still in its infancy. Critical review of the promise and peril of TUR is necessary to assess its potential to grow into a useful means of protecting public health and the environment. To this end, we have assembled this discussion of the pros and cons of TUR.

Several potential problems emerge in attempts to substantiate claims by either proponents or opponents of TUR. For example, since the MA TURA will not require all facilities to have TUR plans until 1994, it is not clear that reported success stories are the rule or the exception. It is not now possible to determine whether TUR successes represent situations that are easy and make sense, and are therefore done early, or are simply a sample of the TUR decisions we will see over time. If the former is the case, it may be that the cost and difficulty of TUR will not become apparent until deadlines loom. If, however, the latter is the case, we can look forward to many success stories as TUR is implemented.

Proponents of TUR have been encouraged by the rapid and widespread adoption of this method of pollution prevention. In general they believe that TUR will increase the level of environmental and public health protection without the long, costly and technocratic risk assessment and standard setting process. Some advocates are now turning to potential problems in implementation of TUR, such as chemical substitution, in an attempt to optimize the technique. Acknowledgment of both benefits and drawbacks of TUR is a first step toward more complete evaluation of its role in pollution prevention.

We find that representatives of industry are, in general, opposed to TUR laws. There are several points of opposition. First and foremost, opponents say that the aspects of TUR that make sense are things that they have been doing all along. In this view TUR is seen as one of

several methods for pollution prevention, not a strategy that should be made mandatory. Industry points to voluntary programs like 33/50 and the 3P and WRAP programs that are accomplishing the goals of TUR without additional legislation, bureaucracy and government oversight of private business. In addition, many small firms are concerned that capital needed to comply with TUR, for both research and development and equipment improvement, will put them at a severe disadvantage to large firms, which employ many scientists and engineers and have greater access to capital. Finally, the focus on use of chemicals, rather than the risks posed by specific uses of chemicals, ignores the many different ways in which chemicals are used and precludes consideration of the benefits of chemical use.

Although TUR is an easily understood method of pollution prevention that is simple to implement, it must be carefully examined if it is to deliver on its promise of decreased risk to workers, consumers and the environment. It is clear from the discussion above that the apparent simplicity of TUR may not reflect the complexity involved in the use of toxic chemicals in the U.S. Much greater experience with pollution prevention will be necessary to determine the optimal method for ensuring the health and safety of citizens while enjoying the benefits of our industrial economy.