A Position Paper of the Implementation Council of the American Institute for Pollution Prevention

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Pollution prevention/waste minimization is a win-win-win situation for government, industry, and the public, which offers more than just protection of the environment for all. Industry gains from reduced capital and operating costs, reduced liabilities, cleaner and safer working conditions, conservation of energy and material resources, and the opportunity for government and industry to work together in a cooperative manner. However, a number of regulatory barriers exist which discourage pollution prevention/waste minimization. This paper provides examples from the aluminum, chemical, petroleum, and wood treating industries of how these regulatory barriers become disincentives. To promote pollution prevention/waste minimization, Congress and the U.S. EPA need to reexamine those RCRA provisions which support a command and control strategy that creates the barriers. The barriers include the distinction between value and valueless materials, offsite storage requirements prior to reuse/recycle, the "Derived from Rule", the "Burning for Fuel Rule", land ban technology standards, and RD&D restrictions. A new RCRA Pollution Prevention/Waste Minimization subtitle is proposed to eliminate or minimize these barriers.

At a conference in 1982 in Winston-Salem, North Carolina, Dr. Paul Palmer, a California chemist active in the field of waste reduction and cleaner technologies for many years, identified a series of barriers to maximum waste reduction[1]. He indicated that about 40 percent of the barriers were political, including piecemeal legislation, bureaucratic resistance, and human conservatism. According to Palmer, financial restrictions cause about 30 percent of the barriers including disposal "subsidies", scarce money, and an entrenched disposal industry. Another 20 percent of the barriers to waste reduction were attributed to media and public ignorance and misinformation. Only about 10 percent of the barriers were attributed to technology.

Much has changed since 1982 pertaining to pollution prevention. The Hazardous and Solid Waste Act set the direction for moving toward waste reduction. State environmental agencies have established information clearinghouses, waste exchanges, and technical assistance programs. The Office of Technology Assessment and subsequently the U.S. EPA became active, with EPA establishing an Office of Pollution Prevention in June 1988. Congress has been active in proposing legislation. Disposal subsidies have been reduced, and the public's awareness and knowledge have increased considerably. Despite these positive developments, most, if not all, of the categorical barriers to waste reduction identified by Palmer still exist. While the percentage each category may contribute is probably different today, legislative and regulatory barriers are still viewed by many as the major obstacles to pollution prevention, waste reduction, and waste minimization.

A Proposal for a New RCRA Subtitle on Pollution Prevention/Waste Minimization

The purpose of this paper is to address what is perceived by much of industry today as the primary barriers to pollution prevention and waste minimization—the regulatory barriers. The Resource Conservation and Recovery Act (RCRA) regulations are based on a command and control strategy—probably the only strategy which could have changed the country's waste management practices. But this strategy is restrictive, punitive, and in the case of pollution prevention/waste minimization, counterproductive.

Pollution prevention, waste reduction, and waste minimization represents a win-win-win situation for government, industry and the public. Pollution prevention and waste minimization offer more than just protection to the environment—they offer operating cost savings, reduced liabilities, cleaner and safer working conditions, and preservation of energy and material resources. A few major companies have been quick to realize these advantages and, voluntarily, have been leading industry in setting the trend towards waste minimization and reduction. However, many industry efforts have been thwarted by restrictive regulations, stringent definitions, and inflexible rules.

A new RCRA Pollution Prevention/Waste Minimization subtitle is proposed to eliminate or minimize these barriers. By providing a new set of regulations which encourage pollution prevention/waste minimization while retaining the restrictive and burdensome regulations pertaining to treatment, control, and disposal of wastes, a major new driving force for waste reduction will result. This paper identifies barriers and issues, summarized in Table 1, which should be addressed in preparing a Pollution Prevention/Waste Minimization subtitle.

llution Prevention Policy—A Fundamental Barrier

Pollution Prevention Policy Statement as pub- the Federal Register[2] was a major step toward ng some of the confusion surrounding the terms prevention, waste reduction, waste minimization, cling. The policy statement replaces the RCRA ste minimization" with the term "pollution preven- ring about a multimedia focus as opposed to a more e focus created by a term associated with RCRA. the policy establishes a hierarchy of waste manage- placing pollution prevention (source reduction and ientally sound recycling) above waste treatment, nd disposal.

licy statement leaves unaddressed, however, where nimization resulting from reuse, recycle and recla- ts into pollution prevention. Wastes once generated ved from the process seem to fall outside the um- pollution prevention. Yet such wastes, properly on-site through segregation, improved work proce- d good housekeeping can be reduced in amount, on-site or off-site treatment requirements. Surely nagement meets the intent of Congress when it that "generation of hazardous waste is to be re- eliminated as expeditiously as possible" concluding ment with "waste nevertheless generated should be so as to minimize the present and future threat to ealth and the environment."[3]

rly, out-of-loop and off-site recycling, although ac- ed that when properly conducted offers the poten- gnificant economic benefits and reduced risk, is not d in the policy statement as fitting into the scope of prevention. The Federal Register notice did re- blic comment on this issue. Perhaps belatedly, the expressed here that out-of-loop and off-site recy- ch results in "minimizing the present and future human health and the environment" and which is d in an environmentally sound, and assured man- fully in the realm of pollution prevention.

, EPA's pollution prevention policy is silent con- reuse and reclamation of secondary materials. If l reuse and reclamation activities can be undertak- environmentally sound manner and result in "mini- ne present and future threat to human health and onment," why do these activities not meet the in- ongress? We believe they do and propose that they ed in the realm of pollution prevention.

to encourage the full range of activities which fall ne realm of pollution prevention and to further re- confusion which surrounds present day terminol- proposed that EPA adopt the following hierarchy tion prevention:

POLLUTION PREVENTION
WASTE REDUCTION
Elimination at the Source
Reduction at the Source
Closed-Loop Recycling, Reuse, and Reclamation
E RECYCLING, REUSE AND RECLAMATION
Out-of-Loop Recycling, Reuse and Reclamation
Off-site Recycling, Reuse and Reclamation

ution prevention hierarchy should be kept separate waste management hierarchy defined as:

WASTE CONTROL/CONTAINMENT
On-site and Off-site Waste Treatment
On-site and Off-site Waste Disposal

on Between Secondary Material and Hazardous Waste

finition of hazardous waste as originally contained is multifaceted and includes the broad categories of hazardous characteristics, nonspecific source listed wastes, specific source listed wastes, and discarded and off-spec commercial chemical products. RCRA focuses on waste management and as such needed to define waste by equating discarded materials with materials having no value. Over the years the complexity of defining when material is a hazardous waste has increased with the evolution of RCRA, leading to explicit exemptions, management based standards (burning as a fuel, recycling) and land banned wastes. Added to these categories of wastes are numerous classifications which associate a waste with a set of regulations in addition to, or in lieu of, those standards which apply to all "RCRA hazardous wastes". These classifications, listed below, compound the complexity of determining when a material is a hazardous waste:

By-product
Corrosive waste treated by elementary neutralization
Dioxin waste
Hazardous waste fuel
Inherently waste-like
Reactive/ignitable
Restricted waste (meets treatment standard)
Restricted waste (does *not* meet treatment standard)
Spent material
Used oil fuel

It is not the purpose of this paper to suggest changing the definition of hazardous wastes which brings a material under the regulation of Subtitle C when it is "managed", that is, treated or disposed of. The purpose is to propose a new definition which would allow a material having value (a secondary material), which is not being treated or disposed of, to be processed to recover or make use of a chemical constituent or property. This definition should result in the material coming under a new RCRA pollution prevention/waste minimization subtitle written to deal with secondary materials.

Obviously, anything done at the source to eliminate or reduce the amount of hazardous waste is outside the scope of RCRA. Once a hazardous waste (as presently defined) is generated and the generator chooses to reuse, recycle or reclaim the waste to recover any beneficial constituent or utilize any property of the waste, the generated waste should not be considered a waste but a secondary material which can be used as a raw material for a reuse, recycle or reclamation process. For example, there are intermediate products possessing hazardous properties which serve as raw materials and subsequently as feedstocks to manufacturing and production processes. There are no regulations on moving intermediate products from one processing unit to another, for transporting, storing, and additional processing. Industry has demonstrated that it is capable of safely handling (avoiding spills, proper storage, proper recordkeeping, etc.) valuable intermediate product.

Why should secondary materials serving as a substitute for a raw material or as an intermediate product be regulated by RCRA any more than "hazardous" process streams or materials which industry presently is safely handling?

The answer may be that a naturally occurring raw material or process stream has historically been given a much greater commercial value than a material which has been considered a "secondary material". But it is the escalating costs of otherwise treating and disposing of the "waste" and subsequent long-term liability which today gives added "value" to proper handling of waste. Economics are driving generators toward environmentally sound raw material substitution or reuse, recycle, and reclamation by converting a "waste" into a process intermediate. To ensure that the economics tip strongly in favor of reuse, recycle and reclamation, hazardous waste regulations for these activities should be less onerous, complex, and costly than those for treatment and disposal.

Table I. Examples of how regulatory barriers have eliminated pollution prevention and waste minimization opportunities for some major industrial wastes

Industry	Waste	Barriers	Comments
Aluminum	Spent Potlining–K088	Distinction between Raw Material and Solid Waste Derived From Rule Burning Rule Permitting (for storage)	Santee Cement Co. terminated receipt of potlining to avoid permitting. Fluoride was beneficially being used in cement while cyanide was being destroyed. Tests had demonstrated no adverse environmental impacts from potlining addition to cement kilns. Potential reuse of 50,000 tons/yr eliminated because of regulatory barriers. Use of potlining as a fluoride mineralizer by American Rockwool, who was paying comparable raw material prices for potlining, terminated because of permitting requirements, derived from rule and burning rule. Extensive tests had demonstrated environmental impact or mineral wool plant improved with use of potlining. Reuse of 7,000 tons/yr of potlining prevented by regulatory barriers.
Woodtreating	•Wastewater treatment sludge from creosote and/or pentachlorophenol–K001	Derived From Rule Delisting	Ash from the incineration of K001 waste is completely inert. Yet due to the derived from rule it is classified as a RCRA hazardous waste. Delisting is a long, drawn-out process, resulting in a completely inert material being landfilled and consuming valuable space in a hazardous waste landfill.
Chemical	Various organic chemicals	Rules pertaining to amount of waste which a research and development laboratory or pilot plant can process.	Research is underway concerning the biodegradation of organic hazardous wastes which requires receipt, storage, and treatment of the wastes. Current rules discourage such work due to the time and quantity restraints imposed by RCRA.
	Still bottoms–K018	Distinction between Raw Material and Solid Waste Permitting (construction)	A process to thermally oxidize K018 wastes, recovering both energy and chlorine in the form of hydrochloric acid has been developed. The 2–6 years time and the cost to obtain a RCRA permit plus the corrective action investigation imposed on an entire chemical plant have resulted in abandonment of the technology.
	Offspec Dowtherm	Permitting (one time treatment requirement) Offsite storage prior to reuse or recycle	Dowtherm became contaminated at customer's plant. It could have been filtered and reintroduced into customer's process. But it could not be stored for treatment at the customer's site and the original manufacturer could not receive it back since he did not have a permit to treat offspec hazardous "waste". The offspec Dowtherm was sent to an incinerator for disposal, a less than desirable or optimum environmental solution.
	Wastewater Recycling	Derived From Rule	Treated wastewater from a RCRA permitted wastewater treatment facility cannot be considered for reuse/recycle in non-critical process applications because of previous association with a listed waste. Resources that might otherwise have been conserved are disposed of, consuming other valuable resources–fresh water makeup and landfill space.
	Various Secondary Materials	Distinction between Secondary Material and Solid Waste Permitting (for storage)	Many secondary materials (coproducts) as well as unused reactants and diluted materials have intrinsic value if they could be recycled. However, for this to be done, some recovery (purification, concentrating, or other cleanup is necessary). Current RCRA waste definitions preclude this from being done except under the harsh RCRA regulations. Many times storage awaiting equipment availability as well as storage for quantity accumulation is necessary. Presently such storage requires a RCRA permit. A storage exemption for reusers/recyclers similar to the 90 day storage provision for generators is needed.
Petroleum	API Separator Sludge K051	Distinction between Raw Material and Solid Waste Permitting (for storage)	Coke produced from petroleum hazardous waste containing oil at the same refinery which generated the waste is exempt from RCRA. For a refinery which does not produce coke, the oil would have to be shipped offsite to a refinery having a coker. The offsite refinery would be regulated by RCRA, which effectively eliminates this reuse alternative.
	Various RCRA Characteristic Wastes	Burning Rule Derived From Rule	Characteristic wastes generated in a petroleum refinery could be burned for energy in a FCC unit. The burning rule would require the entire FCC unit to be permitted as a RCRA treatment facility. The owner, in order to avoid having to permit the FCC, chooses not to burn the characteristic waste, thereby loosing the capacity of the facility for environmentally sound reuse of these characteristic wastes.
	Dissolved Air Flotation K048 API Separator Sludge K051	Delisting	Under current regulations, once a waste is listed as hazardous it must be handled and disposed of as such even though it may no longer be hazardous. The cost of disposal remains the same for listed wastes that have been reused/recycled and for wastes which have not. Delisting is theoretically an option but in reality a virtual impossibility. There is simply no incentive to pursue reuse/recycle.

To achieve this, it is proposed that a new RCRA subtitle be written to cover pollution prevention/waste minimization activities in such a way that generators would naturally choose to be regulated by that subtitle rather than Subtitle C (the new subtitle would obviate the need for the existing provisions in Subtitle C pertaining to recycling). To determine when a material is regulated under the existing Subtitle C or would come under a Pollution Prevention/Waste Minimization Subtitle a distinction between what is a secondary material and what is a hazardous waste must be made.

Other Major Barriers

Off-site Storage Prior to Reuse/Recycle

Provision needs to be made for storing "secondary material" being recycled off-site prior to it being processed. It is not practical to have to instantly process a material as soon as it reaches a recycle facility. RCRA allows a ninety day storage period for generators without imposing a permitting requirement on them—a similar (180 days is suggested) provision is needed for off-site storage prior to recycling. Some storage requirements are imposed on a generator and similar requirements would be reasonable fo a recycler. However, having to get a permit and come under the full burden of RCRA simply discourages many if not most firms from "resource recovery and reclamation" of a secondary material even though such recovery and reclamation would result in reducing the risk to human health and the environment.

"Derived From" and Delisting Rules

The "derived from" rule states that any material derived from a listed hazardous waste is itself a hazardous waste. The primary objective of reuse, recycle and reclamation is to produce a material that is no longer hazardous, while beneficially recovering a chemical or fuel value. Many reuse, recycle and reclamation processes do just that. But the obstacles for delisting the derived material are so great that generators and recyclers simply will not spend the time, effort and resources required. A mechanism is needed, perhaps a de minimis delisting rule, by which a product from a reuse, recycle, or reclamation operation that is no longer hazardous can be readily removed from the hazardous classification. A new pollution prevention/waste minimization subtitle should provide for such a mechanism.

"Burning for Fuel"

A secondary material which contains a fuel component and that is combusted in the process is considered by RCRA to be a waste being "burned for fuel" and is subject to regulation as a hazardous waste. This rule over-rides other considerations such as the presence of valuable chemical constituents (not necessarily the toxic constituent) which it may be more desirable to recover in a high temperature process than the fuel content of the material. The fact that a calorie-bearing constituent is burned in the process or that a toxic constituent is destroyed in the process should not prevent the recovery of the valuable constituent if it can be shown that environmental risks are reduced. The processing of "spent potlining" (an aluminum industry secondary material) in a mineral wool cupola is an example of such a situation. This situation truly represents resource recovery yet is prevented today by RCRA's "burning for fuel" rule.

This barrier could be addressed simply by addressing the barrier related to the distinction between a secondary material and a hazardous waste. If the question of when a material ceases to be a waste and can be considered a secondary material is resolved then the burning rule would not be an issue. By whatever mechanism, the burning for fuel issues need to be addressed to fully realize opportunities for pollution prevention/waste minimization.

Permitting

The difficulties of permitting hazardous waste treatment, storage, and disposal facilities are well known. It is not the intent here to address the problems of pre-construction limitations, timing, costs, etc., of permitting Subtitle C facilities. Perhaps these barriers to permitting should be retained as a disincentive for pursuing treatment and disposal facilities. However, to encourage pollution prevention/waste minimization facilities, in fact, to provide incentives, there should be a streamlined process for permitting reuse, recycle and reclamation facilities.

A new subtitle should allow reuse, recycle or reclamation facilities to proceed with permitting and construction with no more permitting restrictions than a new plant designed to process "raw material" into a finished product would face. Storage requirements may need to be placed on the facility but these should be no more stringent than RCRA's 90 day storage requirements for generators, with 180 days storage suggested to allow for accumulation of inventory needed for batch operations.

To be fully in concert with EPA's Pollution Prevention Policy statement the permitting requirement of the proposed subtitle should be multimedia, with one permit covering air, water, and solid waste (generator) issues. A new subtitle must ensure that the barriers of the existing RCRA permitting process are eliminated.

EPA's program of corrective action is a major disincentive for permitting any type of RCRA facility for any reason. If EPA is to encourage the building of pollution prevention/waste minimization facilities it must restrict the domain of its permits to the facility engaged in a RCRA activity. Extending RCRA's domain to an entire production plant when only a single operation or facility is involved in a RCRA activity is a major disincentive to industry.

Land Ban Technology Standards

Theoretically at least, technology standards imposed by a land ban can eliminate the possibility of using a reuse, recycle, or reclamation process even if that process produces a residue having a lower risk than the technology standard. It is proposed that only performance standards be set by land bans and that industry be allowed to determine what technology it wishes to use to meet those standards.

Research, Development and Demonstration

EPA has published an intent to propose rulemaking which would give permitting flexiblity to hazardous waste research and development facilities. These proposed rules believed to be under consideration by EPA, as the present day rules, do not provide for flexibility in conducting pilot plant testing and full scale, commercial demonstration of promising reuse, recycle or reclamation technology.

Such testing and demonstration often requires large quantities of secondary materials be processed in order to provide for a representative range of waste composition, to achieve desired waste to feed ratios, and to establish steady state process conditions. In many cases, five hundred pounds of waste per hour for periods of up to five days are required to obtain the desired test results. In addition, the testing and demonstration often can be done only on certain equipment or one-of-a-kind test facilities. For these situations it is necessary to obtain an RD&D permit.

These RD&D permits are known to take up to two years to obtain at a cost of hundreds of thousands of dollars. Since the risk that the technology may not work is compounded by

incentive, and in the case of small companies, may not even be able to afford to pursue new reuse, recycle or reclamation technologies. It is essential that innovative technology development for reuse, recycle and reclamation be encouraged if pollution prevention/waste minimization advances are to be expected. The proposed pollution prevention/waste minimization RCRA subtitle needs to streamline and simplify the requirements for permitting research, development and demonstration facilities.

Summary

Pollution prevention/waste minimization represents the mature phase of the environmental protection movement which has been evolving since the early 1960s. Industry is beginning to recognize that pollution prevention/waste minimization reduces operating costs, minimizes long-term liabilities, provides cleaner and safer working conditions, and preserves energy and material resources. Environmentalists see pollution prevention/waste minimization as a means of reducing, if not reversing, adverse environmental impacts. Government is acting as a catalyst to bring about a new ethic with respect to environmental protection. Pollution prevention thus represents an opportunity for all segments of society to win, working together in a cooperative spirit.

Certain legislation and regulations which have created forced incentives for control and containment of wastes once they are generated have unfortunately also created barriers to the pursuit of pollution prevention and waste minimization. By recognizing these barriers and taking steps to replace them with new or modified legislation and regulations designed to encourage pollution prevention/waste minimization, the specific but also mutually desirable objectives of government, industry, and concerned citizens can be more quickly realized. A new RCRA Pollution Prevention subtitle is proposed for achieving this end.

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