ECO-INDUSTRIAL DEVELOPMENT AND THE RESOURCE CONSERVATION AND RECOVERY ACT: EXAMINING THE BARRIER PRESUMPTION

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Abstract: Environmental regulation certainly has its supporters and its critics, but even the most ardent environmentalists recognize that regulation alone has not solved all environmental problems. Creative alternatives in land-use, pollution reduction, and sustainable development are continuously proposed and debated. One possible solution that bodes well for pollution reduction, or even prevention, has been the concept of eco-industrial development (EID). EID describes a closed-loop industrial cycle where generated materials or by-products are returned to the manufacturing process, either used by another facility, or as feedstock for the production of other products. It has been argued, usually by the regulated community, that environmental regulations create unnecessary impediments to creative solutions like EID. The Resource Conservation and Recovery Act (RCRA) regulations are often cited as the most obstructing. This Note examines whether RCRA creates barriers, and if so, to what extent RCRA regulations complicate EID in the United States.

> *"They don't waste anything here," said the guide. . . . "They use everything about the hog except the squeal."*[1]

INTRODUCTION

Industrial ecology describes a closed-loop industrial cycle where generated materials or by-products are returned to the manufacturing process, either used by another facility, or as feedstock for the production of other products.[2] The concept is not new. Industries have long sought ways to maximize use and minimize waste, as long as it helped

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[1] UPTON SINCLAIR, THE JUNGLE 34 (Heritage Press 1965) (1905).

[2] Mary Schlarb, Eco-Industrial Development: A Strategy for Building Sustainable Communities 2 (2001) (report prepared under an award from the U.S. Economic Development Administration, Department of Commerce), *at* http://www.sustainable.doc.gov/business/sbarttoc.htm (last visited Oct. 15, 2001); *see* discussion *infra* Part I.A.

the bottom line.[3] During the mid-nineteenth century, for example, when animals were slaughtered, every useable portion was turned into a marketable commodity.[4] Converting waste into a resource often depends, however, on whether an economically feasible market exists, or can be created.[5]

Before environmental regulation, it was often cheaper to dispose of unmarketable wastes into the "commons" of the air, water, or land, than it was to find alternatives.[6] Without controls, the natural environment is exploited first as a source of raw materials, and second as a "sink" for industrial and consumer waste.[7] The accumulated consequences were not recognized until the 1960s[8] when environmental regulation began to force industries to pay for these previously externalized costs.[9]

Industry's initial hostility to regulation has given way to grudging compliance.[10] Market attitudes continue to evolve "beyond compliance" to include strategies for pollution prevention or reduction[11]

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[3] Deanna J. Richards, Braden R. Allenby, & Richard R. Frosch, *The Greening of Industrial Ecosystems: Overview and Perspective*, *in* THE GREENING OF INDUSTRIAL ECOSYSTEMS 1, 3 (Braden R. Allenby & Deanna J. Richards eds., 1994).

[4] Pierre Desrochers, Eco-Industrial Parks: The Case for Private Planning 1 (1999) (graduate fellowship at Political Economy Research Center), *at* http://www.perc.org/rsl_xsum.htm (last visited Jan. 19, 2002). Bones were made into handles for knives, spoons, brushes, and buttons. Scraps were converted into everything from gelatin to soap, fertilizer, and lubricating oil. *Id.*

[5] Richards, Allenby & Frosch, *supra* note 3, at 4.

[6] *See* ZYGMUNT J.B. PLATER ET AL., ENVIRONMENTAL LAW AND POLICY: NATURE, LAW, AND SOCIETY 17 (2d ed. 1998) (citing Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243, 1243–48 (1968)).

[7] Richards, Allenby & Frosch, *supra* note 3, at 2.

[8] *See* PLATER ET AL., *supra* note 6, at 21.

[9] David M. Driesen, *The Societal Cost of Environmental Regulation: Beyond Administrative Cost-Benefit Analysis*, 24 ECOLOGY L.Q. 545, 553 (1997); *see also* Thomas R. Mounteer, *The Inherent Worthiness of the Struggle: The Emergence of Mandatory Pollution Prevention as an Environmental Regulatory Ethic*, 19 COLUM. J. ENVTL. L. 251, 261–62 (1994).

[10] Kurt A. Strasser, *Preventing Pollution*, 8 FORDHAM ENVTL. L.J. 1, 13 (1996); *see* Richards, Allenby & Frosch, *supra* note 3, at 11.

[11] Dennis A. Rondinelli, *A New Generation of Environmental Policy: Government Business Collaboration in Environmental Management*, 31 Envtl. L. Rep. (Envtl. L. Inst.) 10,891, 10,892 (2001). The terms "pollution prevention," "pollution reduction," "toxic use reduction," and "waste minimization" refer to environmental management options that control or eliminate pollutants by varying degrees. Mounteer, *supra* note 9, at 268. This discussion adopts Congress's and the Environmental Protection Agency's definition of "pollution prevention" as "a hierarchy of management options in descending order of preference: prevention, environmentally sound recycling, environmentally sound treatment, and environmentally sound disposal." Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program, 58 Fed. Reg. 31,114, 31,115 (May 28, 1993) (Interim Final Guidance).

and the "voluntary provision of environmental public goods."[12] Industry will undertake such measures if they will improve strategic competitiveness, distinguish product lines, provide opportunities for greater economic efficiency,[13] or reduce costs of regulatory compliance.[14]

For example, in advance of regulatory mandates against the use of chlorofluorocarbons (CFCs), E.I. Du Pont de Nemours & Co. (DuPont) made costly investments to find CFC substitutes.[15] This strategy proved profitable, allowing DuPont to corner the market, make the global regulatory phase out of CFCs technically feasible, and dominate the field in CFC substitutes.[16]

Some businesses recognize the economic advantages of proactive, rather than merely reactive, environmental management policies.[17] The *New York Times* recently reported that pollution prevention not only improves the corporate image, but can also be surprisingly cost-effective.[18] Nova Chemicals in Chesapeake, Virginia, for example, saved sixteen thousand dollars annually by planting fruit-bearing trees and shrubs for migratory birds, which incidentally eliminated the need for lawn mowing services.[19] Tennessee Valley Authority's air pollution control equipment investment, though initially expensive, also resulted in three million dollars in additional annual sales because the million tons of calcium sulfate powder per year "produced" by the new equipment could be sold as raw material for wallboard.[20]

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[12] Forest Reinhardt, *Market Failure and the Environmental Policies of Firms: Economic Rationales for "Beyond Compliance" Behavior*, 3 MASS. INST. TECH. J. INDUS. ECOLOGY 9, 10–11 (1999). *But see* Michele Ochsner, *Pollution Prevention: An Overview of Regulatory Incentives and Barriers*, 6 N.Y.U. ENVTL. L.J. 586, 600 (1998) (calling for examination of the "public health implications" of an entirely "voluntary pollution prevention" system); *id.* at 601–02 (questioning the actual results of voluntary pollution control by industry).

[13] *See* Reinhardt, *supra* note 12, at 11.

[14] Driesen, *supra* note 9, at 553 ("[P]roducers who figure out how to clean-up more cheaply will have an advantage over polluters who do not."); *see* Ochsner, *supra* note 12, at 610, 616–17.

[15] Reinhardt, *supra* note 12, at 12.

[16] *Id.*

[17] *Id.* at 15; Claudia H. Deutsch, *Together at Last: Cutting Pollution and Making Money*, N.Y. TIMES, Sept. 9, 2001, at § 3-1.

[18] Deutsch, *supra* note 17, at § 3–1. *But see* Reinhardt, *supra* note 12, at 16 (suggesting that "free lunches," the ability to reduce costs by improving environmental performance, may simply be the rational response to the "external cost shock" of environmental regulation).

[19] Deutsch, *supra* note 17, at § 3–1.

[20] *Id.*

The Tennessee Valley Authority's approach exemplifies the lure of the nascent field of industrial ecology, bringing industrial development and pollution prevention together into the new model of eco-industrial development (EID).[21] If EID can improve both economic efficiency and environmental quality, then it may actually bridge the market/environmentalist gap.[22]

Calls for pollution prevention as the new regulatory philosophy may be an industry generated public relations strategy aimed at weakening environmental regulation.[23] Even so, many analysts acknowledge the need to transition from end-of-pipe control to significant pollution reduction or prevention policies.[24] Nonetheless, environmentalists insist that regulatory enforcement is essential to protect public health and the environment against market failure.[25]

Some critics argue that most current environmental regulations impede progress,[26] except those that force technology or provide opportunities for competitive advantage.[27] Others contend that reducing the costs associated with regulatory compliance is a strong impetus for innovation.[28] For example, when the Illinois Department of Environmental Protection lowered the allowable limits of ammonium sulfate discharge, 3M's Cordova chemical manufacturing facility responded

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[21] *See* Schlarb, *supra* note 2, at 2–3.

[22] *See generally id.*

[23] Ochsner, *supra* note 12, at 587–88; *see, e.g.*, Strasser, *supra* note 10, at 8–15 (asserting that pollution prevention should supplement pollution control, because environmental cleanup under the existing control system has "reached a plateau" and is "simply shifting pollution from a more carefully regulated medium to a less carefully regulated one").

[24] *See, e.g.*, Mounteer, *supra* note 9, at 266; Ochsner, *supra* note 12, at 601.

[25] *See* Ochsner, *supra* note 12, at 611, 614. Professor Ochsner argues that "regulation and pollution prevention are not either/or propositions," and that regulation "remains a pivotal incentive" for focusing industrial efforts on the reduction of the more hazardous substances which may lack market-based financial incentives. *Id.* at 611, 616–17.

[26] *See, e.g.*, Strasser, *supra* note 10, at 8–15 (insisting business usually reacts to regulation by installing familiar, rather than innovative, end-of-pipe technology).

[27] *E.g.*, Reinhardt, *supra* note 12, at 11–12. DuPont's research for CFC substitutes slowed when global support for CFC regulation waned, then increased during the late 1980s when the regulatory wind changed, suggesting a correlation between the profitability of the research and the threat of a CFC ban. Strasser, *supra* note 10, at 12–14 (acknowledging that a product ban threat is technology forcing, but asserting that most regulation merely requires the application of known technology to pollution control).

[28] Driesen, *supra* note 9, at 575–76 n.137 (citing Michael E. Porter & Claas Van der Linde, *Toward a New Conception of the Environment-Competitiveness Relationship*, 9 J. ECON. PERSP. 97 (1997)); Michael E. Porter, *America's Green Strategy*, SCI. AM., Apr. 1991, at 168; *see also* Reinhardt, *supra* note 12, at 15–16. Where a slow rate of return on investment through material or process cost savings may not justify a pollution prevention project, savings over the cost of an "end-of-pipe alternative" can spur innovation. Ochsner, *supra* note 12, at 595, 607–09.

by substituting the ammonium sulfate used in its manufacturing process with non-regulated sodium hydroxide.[29]

Recognizing the limits of existing media-specific, end-of-pipe pollution control programs to improve environmental quality, in 1989 the Environmental Protection Agency (EPA) proposed the establishment of the Pollution Prevention Office to develop and implement a "comprehensive pollution prevention policy."[30] The new policy sought to encourage "pollution prevention through source reduction and environmentally sound recycling" to supplement EPA's pollution treatment, storage, and disposal regulations.[31] Congress followed suit in 1990, enacting the Pollution Prevention Act[32] requiring EPA to "develop and implement a strategy to promote source reduction."[33] The Act was designed to "stimulate voluntary pollution prevention" strategies with an emphasis on source reduction.[34]

The George H.W. Bush and William J. Clinton administrations sponsored a number of initiatives to reform regulatory policy.[35] President Clinton, for example, established the President's Council on Sustainable Development in 1993 to "develop and recommend to the President a sustainable development strategy,"[36] which he expected would "promote healthy communities and environmentally sound products and services."[37] EPA initiatives arising from these new policy directives included the multimedia cluster permitting concept that was challenged by industry and environmentalists alike,[38] as well as

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[29] Ochsner, *supra* note 12, at 607–08.

[30] Pollution Prevention Policy Statement, 54 Fed. Reg. 3845, 3845 (Jan. 26, 1989) (proposed policy statement).

[31] *Id.* at 3845 (recognizing, nonetheless, that "safe treatment, storage and disposal" must continue to be "important components of an environmental protection strategy").

[32] Pollution Prevention Act of 1990, 42 U.S.C. §§ 13,101–13,109 (2000).

[33] *Id.* § 13,103(a)–(b).

[34] Stephen M. Johnson, *From Reaction to Proaction: The 1990 Pollution Prevention Act*, 17 COLUM. J. ENVTL. L. 153, 170 (1992). Congress determined that "mandatory pollution prevention is neither required nor desirable." *Id.*

[35] Bradford C. Mank, *The Environmental Protection Agency's Project XL and Other Regulatory Reform Initiatives: The Need for Legislative Authorization*, 25 ECOLOGY L.Q. 1, 13 (1998).

[36] Exec. Order No. 12,852, 58 Fed. Reg. 35,841 (June 29, 1993). Sustainable development was defined as "economic growth that will benefit present and future generations without detrimentally affecting the resources or biological systems of the planet." *Id.*

[37] President William J. Clinton, Remarks on the President's Council on Sustainable Development, (June 14, 1993), *at* http://frwebgate4.access.gpo.gov (last visited Jan. 20, 2002).

[38] Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Pulp, Paper, and Paperboard Category; National Emission Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production, 58 Fed. Reg.

the somewhat more successful Common Sense Initiative (CSI)[39] and Project XL programs.[40]

The regulatory structures existing at the time required separate permits for each type of medium (air, water, and land disposal) and each facility source.[41] The "cluster" proposal involved combining Clean Air Act and Clean Water Act directives into single cluster permits for the pulp and paper industry.[42] Criticism from both industry and environmentalists caused EPA to shelve the idea.[43] In 1994, EPA's CSI proposed pilot programs to develop industry-based multimedia permitting with the goal of allowing more regulatory flexibility than available under traditional "command-and-control" regulations.[44] The idea was to find "cleaner, cheaper, [and] smarter" ways to achieve pollution prevention and reduction goals "for entire industries."[45]

EPA's 1995 Project XL proposal, with a stated goal of implementing fifty pilot programs across the country, asked business and industry to present projects that, if accepted, would receive EPA "flexibility from existing regulation."[46] As of September 2000, Project XL produced over fifty proposals or projects.[47] Multimedia and bubble permitting are examples of the flexibility options currently offered by EPA.[48]

66,078, 66,146–48 (proposed Dec. 17, 1993) (to be codified at 40 C.F.R. pts. 63, 400) [hereinafter Proposed Multimedia Rules]; Mank, *supra* note 35, at 14.

[39] Common Sense Initiative Council Federal Advisory Committee; Establishment, 59 Fed. Reg. 55,117 (Nov. 3, 1994) [hereinafter CSI].

[40] Regulatory Reinvention (XL) Pilot Projects, 60 Fed. Reg. 27,282 (May 23, 1995) (solicitation of proposals and request for comment).

[41] *See* Mank, *supra* note 35, at 14.

[42] Proposed Multimedia Rules, *supra* note 38, 58 Fed. Reg. at 66,078, 66,148; Mank *supra* note 35, at 14.

[43] Proposed Multimedia Rules, *supra* note 38, 58 Fed. Reg. at 66,078, 66,148; Mank *supra* note 35, at 14.

[44] *See* CSI, *supra* note 39, 60 Fed. Reg. at 55,117; Mank *supra* note 35, at 14–15.

[45] *See* CSI, *supra* note 39, 60 Fed. Reg. at 55,117; Mank *supra* note 35, at 14–15.

[46] Regulatory Reinvention (XL) Pilot Projects, 60 Fed. Reg. 27,282, 27286 (May 23, 1995). The XL criteria includes a requirement that the project achieve superior environmental results than under existing and anticipated regulations, hoping to realize program goals by reducing compliance costs and increasing environmental benefits. *Id.*

[47] U.S. ENVTL. PROT. AGENCY, PUB. NO. 100-R-00-023B, 2000 COMPREHENSIVE REPORT: PROJECT XL: DIRECTORY OF PROJECT EXPERIMENTS AND RESULTS, vol. 2, at i (2000), *at* www.epa.gov/projectxl/vol2toc.htm (last visited Apr. 9, 2002) [hereinafter PROJECT XL DIRECTORY].

[48] Mank, *supra* note 35, at 20. Bubble permitting allows the EPA to consider a facility as one "source" as though it were within a bubble, thus requiring a single permit for the entire facility, rather than individual permits for each emitting source. Chevron U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837, 866 (1984).

Seeing the glass as half-empty, some critics argue that the underfunded EPA programs were ineffective because they did not sufficiently shift regulatory focus from command-and-control strategies.[49] Critics contend that without dramatic regulatory change, pollution prevention concepts like industrial ecology cannot be implemented. The Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA),[50] and its regulations distinguishing discarded from recycled materials are commonly cited as serious impediments to EID.[51]

This Note considers recent trends in regulatory flexibility and the current and potential distinctions between discarded and recycled materials under RCRA, to examine whether such claims are valid. Part I commences with the concept of EID and the perceived barriers to its inception. Part II introduces the statute and examines the statutory, regulatory, and judicial definitions of solid waste, hazardous waste, and recycling; including exemptions, exclusions, and variances. Part III considers whether RCRA is a significant barrier to EID in light of recent cases and regulatory trends, and suggests opportunities to minimize remaining impediments.

I. Eco-Industrial Development

A. *The Concept*

Eco-industrial development (EID) is essentially a blend of resource conservation, pollution prevention, and industry efficiency;[52] encompassing a variety of approaches including "industrial ecology, industrial clustering, sustainable design, and product life cycle analysis."[53] The concept involves the creation of synergistic relationships between various industries for the purposes of resource sharing, conservation, waste stream recycling, and, ultimately, cost savings.[54]

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[49] Rondinelli, *supra* note 11, at 10,897 (citing U.S. Gov't Accounting Office, Pub. No. RCED-97-164, Regulatory Reinvention: EPA's Common Sense Initiative Needs an Improved Operating Framework and Progress Measures 12 (1997)).

[50] Resource Conservation and Recovery Act of 1976, 42 U.S.C. §§ 6901–6992k (2000).

[51] *E.g.*, Desrochers, *supra* note 4, at 18; *see* discussion *infra* Part I.B.2.

[52] *See* Schlarb, *supra* note 2, at 2.

[53] *Id.*

[54] Richards, Allenby & Frosch, *supra* note 3, at 6; Schlarb, *supra* note 2, at 1.

1. Industrial Ecology

EID is the practical application of the theory of "industrial ecology," a phrase coined by General Motors' researchers Robert A. Frosch and Nicholas E. Gallopoulos.[55] Industrial ecology is the theory that an industrial system can mimic nature, such that "materials, and the energy embedded in them . . . circulate in a large, complex web," eliminating or minimizing waste.[56] Each firm, "analogous to biological organisms,"[57] inputs materials, utilizes them for the production of its externally marketed products, and then outputs what it cannot use for use by other firms within the system.[58]

Robert Frosch argued that if we are to avoid eventually wallowing in our own waste, the existing open industrial system, which takes in virgin materials and discards wastes, must be supplanted by a closed-loop system where materials retain value and use.[59] Even when discarded, he asserts, many materials could be inventoried for future use.[60] They are unrecoverable only because we do not design landfills "like filing cabinets from which we can readily remove desired items."[61] In its broadest concept, industrial ecology envisions industries networking with communities and other industries to create a giant closed-loop industrial ecosystem.[62]

2. From Theory to Practice

The theory of a closed-loop, symbiotic industrial system has, perhaps, been most fully actuated in Kalundborg, Denmark.[63] The mu-

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[55] Schlarb, *supra* note 2, at 3 (citing Robert A. Frosch & Nicholas E. Gallopoulos, *Strategies for Manufacturing*, SCI. AM., Sept. 1989, at 144–52).

[56] Richards, Allenby & Frosch, *supra* note 3, at 3.

[57] *Id.* at 2; *see* Robert A. Frosch, *Industrial Ecology: Adapting Technology for a Sustainable World*, ENV'T, Dec. 1995, at 16–24, 34–37.

[58] Schlarb, *supra* note 2, at 3.

[59] Frosch, *supra* note 57, at 16.

[60] *Id.* at 22.

[61] *Id.* This idea has been put into action at the Monterey Resource Recovery Park in Marina, California. Developed out of an existing landfill, the park allows area residents to purchase reusable items including paints, insecticides, building materials, clothing and furniture. In addition, landscaping supplies, compost products and repaving materials are processed on site. U.S. ENVTL. PROT. AGENCY, JOBS THROUGH RECYCLING: SPECIAL TOPICS: ECO-INDUSTRIAL PARKS: EIP EXAMPLES, *at* http://www.epa.gov/epaoswer/non-hw/recycle/jtr/topics/eipex.htm (last updated Apr. 23, 2001) [hereinafter EIP EXAMPLES WEBSITE].

[62] *See* Frosch, *supra* note 57, at 16–24.

[63] Nicholas Gertler, Industrial Ecosystems: Developing Sustainable Industrial Structures, ch. 1 (1995) (unpublished M.S. thesis, Massachusetts Institute of Technology), *at*

nicipality and four industries (a coal-fired power plant, an oil refinery, a pharmaceutical and enzyme manufacturer, and a plasterboard manufacturer) reuse each other's waste streams in their own operations.[64] The power plant's hot water discharge is used to provide heat for tanks in its fish farm, while the plant's steam release is used to heat the pharmaceutical company, and thirty-five hundred homes in the district.[65] Surrounding farms use organic sludge from the pharmaceutical company as fertilizer.[66] The plasterboard manufacturer uses gypsum from the power plant's sulphur dioxide (SO_2) scrubber and gas as fuel from the oil refinery.[67] This networking of systems has resulted in both the reduction of wastes[68] and significant cost savings.[69]

Kalundborg's success was not the result of eco-industrial planning,[70] but rather developed over time, facilitated by the interpersonal relationships and initiative of the individual managers.[71] Arguably, the primary motivation may have been to reduce compliance costs of "ever-stricter environmental regulations," not environmental altruism.[72] Regardless of the motivation, the results are impressive.[73]

So far, eco-industrial projects have followed one of two models: the eco-industrial park (EIP) or the eco-industrial network (EIN) model. In the former, symbiotic relationships are planned and maintained within a limited defined area. The EIN model expands the relationship to the municipality or region.[74] Existing EIPs vary in design and emphasis.[75] They may have physically connected business net-

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http://www.sustainable.doe.gov/business/gertler2.shtml (last visited Nov. 5, 2001); Schlarb, *supra* note 2, at 19.

[64] Gertler, *supra* note 63, at ch. 1; Schlarb, *supra* note 2, at 19.

[65] Gertler, *supra* note 63, at ch. 2; Schlarb, *supra* note 2, at 19.

[66] Gertler, *supra* note 63, at ch. 2; Schlarb, *supra* note 2, at 19.

[67] Gertler, *supra* note 63, at ch. 2.

[68] *Id.* (annual oil consumption reduced by nineteen thousand tons, coal consumption by two percent, carbon dioxide (CO_2) emissions by three percent, and sulphur dioxide (SO_2) emissions by fifty-eight percent, although some of the SO_2 reduction may be attributable to required pollution-control technology).

[69] *Id.*

[70] Desrochers, *supra* note 4, at 1.

[71] Gertler, *supra* note 63, at ch. 2; *see* Schlarb, *supra* note 2, at 19.

[72] Gertler, *supra* note 63, at ch. 2 ("While participating companies herald the environmental benefits of the symbiosis, it is economics which drives or thwarts its development.").

[73] Gertler, *supra* note 63, at ch. 2. Gertler lists "four types of tangible benefits" from industrial symbiosis: (1) reduced raw materials use; (2) reduced pollution discharge; (3) increased energy efficiency; and (4) waste disposal cost reductions. *Id.*

[74] Schlarb, *supra* note 2, at 5–6.

[75] *See id.*

works (closed-loop model); restrict park members to companies that are "green" or do not emit pollution; focus on infrastructure by using buildings and landscaping designed to conserve energy, water, and other resources; or any combination of the above.[76]

The closed-loop model has proven the most challenging to put into practice.[77] Finding and matching the waste stream and raw material requirements of firms with the financial and technical resources necessary for success can be daunting,[78] but a few examples exist.[79] In 1994, EPA, under the auspices of the President's Council on Sustainable Development,[80] worked with various projects including a sustainable community concept in Chattanooga, Tennessee.[81] Commenced as a standard urban redevelopment project, it became a conservation and preservation model.[82] It attracted national attention while turning an economically disadvantaged area into a thriving environmental technology center.[83]

The second eco-industrial model, EIN, has a broader field of vision. Analogous to the concept of industrial ecology as a system-wide ideal, EIN focuses on developing joint ventures or "waste exchange networks" among various entities within a community or region.[84] Like the Kalundborg model, these ventures tend to develop "naturally" as business managers look beyond regulation compliance to maximize environmental and market efficiency. [85]

Sometimes labeled "virtual eco-parks," EINs involve geographically separated businesses working together to minimize pollution and

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[76] *Id.*

[77] *Id.* at 4.

[78] *Id.*

[79] *See, e.g.*, U.S. ENVTL. PROT. AGENCY, PUB. NO. 530-N-00-002, WASTE WISE UPDATE: MOVING TOWARD SUSTAINABILITY 10 (2000), *available at* www.epa.gov/wastewise/wtr/updates.htm [hereinafter WASTE WISE]. The Mississippi Red Hills Ecoplex, "one of about 20 [EIPs] currently in the works" includes a power plant, cement, brick, and wallboard manufacturers, a fish farm, and a greenhouse. The lignite-based power plant sells its clay by-product to the brick manufacturer. Plans are in the works to sell its fly ash "waste" for cement or wallboard. The heated water discharge is used by the greenhouse, which also exchanges with the fish farm. *Id.*

[80] Exec. Order No. 12,852, 58 Fed. Reg. 35,841 (June 29, 1993); Schlarb, *supra* note 2, at 20.

[81] Gertler, *supra* note 63, at ch. 4.

[82] *Id.*

[83] *Id.*

[84] Schlarb, *supra* note 2, at 6.

[85] *See* Desrochers, *supra* note 4, at 17.

maximize savings.[86] The joint venture between Con Agra and DuPont provides an example.[87] Working collectively, they developed the technology to turn Con Agra's cheese whey waste into lactic acid used by DuPont to make polylacticides, a biodegradable plastic.[88]

Some EIP advocates insist that engineers are required to design and develop successful parks.[89] Others point out that Kalundborg evolved naturally because of private business priorities[90] and the development of business relationships.[91] Yet, Kalundborg is a hybrid of the two models; its relationships extend beyond the core industries to the surrounding community (like an EIN), but it is small and insular similar to a park.[92]

These differences in model and approach are significant, affecting the analysis of impediments to eco-industrial development.[93] Through proactive planning and design of an EIP, for example, regulatory barriers may be avoidable, whereas existing hazardous waste generators seeking to reduce responsibility through EINs will likely encounter more obstacles.[94]

B. *Barriers to Eco-Industrial Development*

1. General Problems Facing EIDs

As previously mentioned, the closed-loop system presents certain unique challenges.[95] First, finding appropriate firms for a park can mean turning away unsuitable businesses, often requiring both political will and economic flexibility.[96] Additionally, some risk management strategies may advise against the interdependency needed in the EIP model.[97] Economic justification for the necessary front-loaded investment is directly related to the viability of the other partners.[98] To

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[86] An example is the Brownsville Project in Brownsville, Texas, which "takes a regional approach to exchanging materials and byproducts." EIP EXAMPLES WEBSITE, *supra* note 61.

[87] Strasser, *supra* note 10, at 54–55.

[88] *Id.*

[89] *See* Desrochers, *supra* note 4, at 1.

[90] *Id.* at 4.

[91] *Id.* at 3–4; *see* Gertler, *supra* note 63, at ch. 2; Schlarb, *supra* note 2, at 19.

[92] *See* Gertler, *supra* note 63, at ch. 2; Schlarb, *supra* note 2, at 19.

[93] *See* discussion *infra* Part III.B.

[94] *See* discussion *infra* Part III.B.

[95] *See* discussion *supra* Part I.A

[96] Schlarb, *supra* note 2, at 5–6.

[97] *Id.* at 10.

[98] *Id.*

avoid raw material source disruption, businesses can arrange alternative supply sources as a back up,[99] yet costs for occasionally substituted raw materials would be higher than that for larger volumes under contractual agreement.[100] Finally, liability exposure may initially discourage some businesses from building in an eco-industrial park.[101] If a waste stream is hazardous, park tenants may be potentially responsible parties under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).[102]

Differences in business philosophy can also create hurdles.[103] Before their joint venture could work, Con Agra and DuPont had to reconcile their divergent corporate mind-sets, investment strategies, and research and development policies.[104] The cooperation and information sharing requirements of eco-industrial development goes against the dominant corporate mind-set.[105] For both EINs and EIPs, partner matching is further complicated by corporate reluctance to share production, waste discharge, and raw material information with potential competitors.[106] Over the past ten years, waste exchange databases,[107] EPA software programs,[108] chambers of commerce network-

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[99] *Id.*

[100] *Id.*

[101] Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9607 (2000). CERCLA imputes liability to owners and operators of any facility where hazardous waste has been disposed of, and on persons who contract, accept, or arrange for "disposal or treatment" of hazardous substances. *Id.* § 9607(a)(1)–(4). A facility is defined broadly to include "any building, structure, installation, equipment, pipe or pipeline ... [and] any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located." *Id.* § 9601(9)(A)–(B).

[102] *See generally id.* § 9607 (imputing liability for the clean-up of hazardous waste). *But see* Ian Erickson, Comment, *Reconciling the CERCLA Useful Product Recycling Defenses*, 80 N.C. L. Rev. 605, 609–12 (2002). Erickson reviews various sources of law distinguishing disposed wastes from "useful products" and recycled materials as defenses to the charge of arranging for the "disposal or treatment" of hazardous substances. *Id.* To define hazardous substances, CERCLA incorporates pollutants identified and defined by various statutes, including RCRA. 42 U.S.C. § 9601(14).

[103] *See* Strasser, *supra* note 10, at 54–55.

[104] *Id.*

[105] Schlarb, *supra* note 2, at 26.

[106] *See id.*

[107] *Id.* at 26–27. Some examples include the New York Industrial Waste Recycling and Prevention Program's web-based searchable database called Wa$teMatch and Florida's SWIX Clearinghouse on http://www.ElectronicXchange.org, which lists recycling and exchange items. *Id.*

[108] *Id.* at 27 (called the DIET/FAST program for identifying potential combinations for EIPs based upon area, type, economics, and potential environmental benefits).

ing, and various university programs have improved EID information resources.[109]

2. The Regulatory Barriers Presumption

In addition to market-based barriers, EID proponents insist that new regulatory philosophies must be developed before pollution prevention ideas like industrial ecology can be achieved,[110] citing the potential regulatory impediments of antitrust and environmental laws.[111] Environmental regulatory barriers, particularly those posed by RCRA, are found on, or near the top of the list of EID obstacles.[112] RCRA's definition of waste is cited as "the most glaring regulatory problem[] in the creation of industrial loops . . . ."[113] Specifically, it is claimed that the circular logic of EPA's solid waste definition[114] causes many recycling options to become mired in the expensive bureaucratic quagmires of permitting, reporting, and potential liabilities.[115]

Industrial ecology advocates usually do not deny the need to regulate hazardous material management or recycling.[116] Rather, it is asserted that changes in RCRA's definition and treatment of recycled materials are necessary before pollution prevention strategies like EID can work.[117] Efforts to redefine recycling, however, are hampered by

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[109] *Id.*

[110] Richards, Allenby & Frosch, *supra* note 3, at 5; Desrochers, *supra* note 4, at 18–22; Gertler, *supra* note 63, at ch. 5; Schlarb, *supra* note 2, at 29–31.

[111] Richards, Allenby & Frosch, *supra* note 3, at 5. Information pooling and cooperative action among competitors may back up against anti-trust laws if it results in the elimination of competition. Frederick R. Anderson, *From Voluntary to Regulatory Pollution Prevention, in* THE GREENING OF INDUSTRIAL ECOSYSTEMS 98, 103 (Braden R. Allenby & Deanna J. Richards eds., 1994).

[112] Richards, Allenby & Frosch, *supra* note 3, at 5; Desrochers, *supra* note 4, at 18–22; Gertler, *supra* note 63, at ch. 5; Schlarb, *supra* note 2, at 29–31.

[113] Desrochers, *supra* note 4, at 18.

[114] Gertler, *supra* note 63, at ch. 5 ("Solid waste is a discarded material, a discarded material is anything inherently waste-like . . . [and] recycled materials are defined as discarded . . . [even though] to 'discard' has the common meaning 'to throw away.'"); *see* discussion *infra* Part II.B.

[115] Desrochers, *supra* note 4, at 19.

[116] *See, e.g.*, Gertler, *supra* note 63, at ch. 5 ("Managed improperly, industrial byproducts pose a threat to human health, and the environment as experience shows. However, careful and well-thought-out re-routing of byproducts as feedstocks can achieve the same if not greater levels of environmental safety as regulated disposal . . . .").

[117] R. Michael Sweeney, *Reengineering RCRA: The Command Control Requirements of the Waste Disposal Paradigm of Subtitle C and the Act's Objective of Fostering Recycling—Rethinking the Definition of Solid Waste, Again*, 6 DUKE ENVTL. L. & POL'Y F. 1, 10 (1996).

EPA's legitimate concern that "sham recycling" could allow toxic materials to bypass regulatory protections.[118]

The question of whether RCRA poses a formidable barrier to an eco-industrial development requires answers to other questions. First, does the project involve transfer of "solid wastes" as currently defined by RCRA, and if so, are the wastes hazardous? Second, even if a project includes generators of hazardous solid waste, does RCRA necessarily foreclose the project?

II. The Resource Conservation and Recovery Act of 1976

A. *Overview*

1. Statutory Framework

Congress amended the Solid Waste Disposal Act by passing RCRA to "reduce the generation of hazardous waste . . . 'so as to minimize the present threat to human health and the environment.'"[119] Existing and new facilities that generate, treat, store, or dispose of hazardous wastes are subject to RCRA's controls,[120] while inactive and abandoned sites fall under the jurisdiction of CERCLA.[121] CERCLA assigns liability for the cleanup of any site contaminated by a hazardous substance to any responsible party including those who "arrange for disposal."[122] Hazardous substances under CERCLA include "any hazardous waste having the characteristics identified under or listed" under

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[118] Phillip L. Comella, *Understanding a Sham: When Is Recycling Treatment?*, 20 B.C. ENVTL. AFF. L. REV. 415, 416–420 (1993).

[119] Meghrig v. Ky. Fried Chicken W., Inc., 516 U.S. 479, 483 (1996) (quoting Resource Conservation and Recovery Act, 42 U.S.C. § 6902(b) (2000)).

[120] Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901–6922k.

[121] Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601–9675 (2000).

[122] 42 U.S.C. § 9607(a)(1)–(3); *see* discussion *supra* note 102.

RCRA.[123] Thus, any substance identified as a hazardous waste under RCRA also carries potential liability under CERCLA.[124]

The Hazardous and Solid Waste Amendments of 1984 (HSWA),[125] with seventy-two major provisions, substantially expanded RCRA's scope and impact on businesses in the United States.[126] Congress determined that land disposal "should be the least favored method for managing hazardous wastes."[127] Thus, HSWA required EPA to promulgate restrictions on hazardous waste land disposal by May 1990 to avoid the "hammer" of a statutory ban on all such land disposal.[128] Congress also directed EPA to divide hazardous wastes into groups and establish a schedule for setting standards for each group.[129] Finally, since "methods are available to separate usable materials from solid waste"[130] providing "a potential source of solid fuel, oil, or gas that can be converted into energy,"[131] Congress also directed EPA to consider recycling as an alternative to disposal.[132]

Solid waste is subdivided into non-hazardous and hazardous wastes.[133] Individual states regulate non-hazardous solid waste pursuant to subtitle D for which EPA has limited enforcement authority.[134] Subtitle C's stringent requirements authorize EPA to control hazardous wastes.[135]

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[123] Edward Hines Lumber Co. v. Vulcan Materials Co., 685 F. Supp. 651, 654 n.2 (N.D. Ill. 1988). CERCLA's hazardous substances include, but are not limited to hazardous wastes. Further, solid wastes exempted from RCRA's hazardous waste definition are not necessarily excluded from liability under CERCLA. B.F. Goodrich Co. v. Murtha, 958 F.2d 1192, 1201–02 (2d Cir. 1992) ("Congress and the EPA have carefully distinguished between *wastes*, to which [RCRA] applies, and *substances*, to which CERCLA applies.") (citations omitted).

[124] *See Murtha*, 958 F.2d at 1201–02; *Edward Hines Lumber*, 685 F. Supp. at 654 n.2. For a discussion on useful product and recycling defenses to CERCLA liability, which may be particularly applicable to EID, see Erickson, *supra* note 102, at 609–12.

[125] Hazardous and Solid Waste Amendments of 1984, 42 U.S.C. §§ 6917, 6936–6939b, 6949a, 6979b, 6991 (2000).

[126] David R. Case, *Resource Conservation and Recovery Act*, *in* ENVIRONMENTAL LAW HANDBOOK 44, 46 (Thomas F.P. Sullivan ed., 13th ed. 1995).

[127] 42 U.S.C. § 6901(b)(7).

[128] Case, *supra* note 126, at 46.

[129] 42 U.S.C. § 6924(g)(4); Am. Petroleum Inst. v. United States Envtl. Prot. Agency, 906 F.2d 729, 732 n.1 (D.C. Cir. 1990).

[130] 42 U.S.C. § 6901(c)(2).

[131] *Id.* § 6901(d)(1).

[132] Case, *supra* note 126, at 47.

[133] *Id.* at 73.

[134] *Id.*

[135] B.F. Goodrich Co., v. Murtha, 958 F.2d 1192, 1202 (2d Cir. 1992); Case, *supra* note 126, at 48–51.

Subtitle C requires the monitoring of hazardous wastes from "cradle-to-grave" by imposing permitting, tracking, and handling requirements on those who generate and transport hazardous waste, as well as the operators and owners of treatment, storage, and disposal (TSD) facilities.[136] Generators or producers of hazardous waste maintain responsibility for the materials from the point of production (the "cradle") to the point of disposal (the "grave") and must prepare tracking manifests to follow the material throughout its "life."[137] Persons who move any hazardous materials any distance off the production site must comply with RCRA's transport standards.[138] Finally, TSD facilities are strictly regulated to ensure that hazardous wastes are treated, stored, and disposed of safely.[139]

2. Definitions of Solid Waste

Meeting RCRA's subtitle C requirements can be onerous and costly, so the critical threshold issues are determining, first, whether a material is a "solid waste" and, if so, whether it is "hazardous."[140] If it is not a solid waste, it cannot be classified as a hazardous waste, and RCRA does not apply.[141] Thus, the solid waste determination may be crucial to cost-effective, waste-stream reuse in eco-industrial development.[142]

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[136] 42 U.S.C. § 6921; Am. Petroleum Inst. v. United States Envtl. Prot. Agency, 906 F.2d 729, 732–33, (D.C. Cir. 1990); Case, *supra* note 126, at 44.

[137] 42 U.S.C. § 6922. A generator is "any person, by site, whose act or process produces hazardous waste identified or listed in part 261 [of the RCRA regulations] or whose act first causes a hazardous waste to become subject to regulation." 40 C.F.R. § 260.10 (2001). Wastes must be packaged into approved containers, and marked with an identification number that allows tracking to its final destination. 42 U.S.C. § 6922(a)(1)–(5); Comella, *supra* note 118, at 422–23.

[138] 42 U.S.C. § 6923; Case, *supra* note 126, at 58.

[139] 42 U.S.C. §§ 6924–25; Case, *supra* note 126, at 59. Disposal facilities must be able to manage the waste, provide security, have emergency plans in place to handle releases or problems, and have a closure plan (as well as a post-closure plan for land disposal). Any such facility must prove financial stability to fulfill these obligations. Comella, *supra* note 118, at 425–26.

[140] 40 C.F.R. § 262.11; Comella, *supra* note 118, at 421–22; Sweeney, *supra* note 117, at 11–13.

[141] 42 U.S.C. § 6903(5) ("'[H]azardous waste' means a solid waste, or combination of solid wastes . . . ."); Conn. Coastal Fishermen's Ass'n v. Remington Arms Co., 989 F.2d 1305, 1313 (2d Cir. 1993); Am. Mining Cong. v. United States Envtl. Prot. Agency, 907 F.2d 1179, 1185 (D.C. Cir. 1990) (quoting Am. Mining Cong. v. United States Envtl. Prot. Agency, 824 F.2d 1177, 1179 (D.C. Cir. 1987) [*AMC I*]) (EPA's authority "extends only to the regulation of 'hazardous waste' . . . defined as a subset of 'solid waste . . . .'").

[142] *See* Desrochers, *supra* note 4, at 19.

Unfortunately, making such determinations can be confusing.[143] The vague statutory definition of solid waste differs from the regulatory definition.[144] Congress defined solid waste as:

> [A]ny garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other *discarded material*, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities . . . .[145]

The solid waste definition does not include: (1) domestic sewage; (2) irrigation return flows; (3) point source industrial discharges under the Clean Water Act; or (4) "source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954."[146] Courts have applied the statutory interpretation only in limited situations.[147]

The statute does not specifically define the key phrase discarded materials, leaving the agency and/or courts to provide meaning.[148] The broad statutory definition of "disposal" as "the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water" has not provided significant guidance.[149]

EPA's regulatory definition of "solid waste" is "any discarded material that is not excluded" under 40 C.F.R. § 261.4(a) or by variance.[150] If a material is discarded, it is solid waste unless EPA specifically removes it from the solid waste category, usually by conditional exemption.[151] EPA defines "discarded" as "abandoned,"[152] "re-

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[143] *Conn. Coastal Fishermen's Ass'n*, 989 F.2d at 1308 (noting that RCRA has an "Alice in Wonderland" quality to it because the term "solid waste" means different things in different parts of the statute); Sweeney, *supra* note 117, at 13.

[144] *Conn. Coastal Fishermen's Ass'n*, 989 F.2d at 1314–16.

[145] 42 U.S.C. § 6903(27) (emphasis added).

[146] *Id.* § 6903(27) (citation omitted).

[147] Sweeney, *supra* note 117, at 13–15 (statutory definition has been applied by the courts for "imminent hazard" actions brought by citizens or the government, and for inspection, monitoring, and testing requirements).

[148] *See, e.g.*, *Conn. Coastal Fishermen's Ass'n*, 989 F.2d at 1314–16; Am. Petroleum Inst. v. United States Envtl. Prot. Agency, 906 F.2d 729, 740–42 (D.C. Cir. 1990).

[149] 42 U.S.C. § 6903(3); *Conn. Coastal Fishermen's Ass'n*, 989 F.2d at 1314.

[150] EPA Identification and Listing of Hazardous Waste, 40 C.F.R. § 261.2(a)(1) (2001) (emphasis added). Section 261.4, originally a fairly short list of exclusions, has been amended thirty-three times since 1990 alone. *See id.* § 261.4.

[151] 40 C.F.R. §§ 261.2(a)(1), 261.4.

[152] 40 C.F.R. § 261.2(a)(2)(i).

cycled,"[153] "inherently waste-like,"[154] or "military munition"[155] materials. Although tracking these definitions can be complex, EPA's logic is to widely spread its regulatory authority, then remove from the solid waste category anything that it deems to be legitimately recycled or actually needed to make a product.[156]

A material is "abandoned" when it is disposed of, burned, or incinerated, or when it is accumulated, stored, or treated but not recycled.[157] Certain listed materials are solid wastes due to the manner in which they are recycled, such as by disposal on land, or when used to make other products that are placed on land, either directly or in containers.[158] This exception to the "recycled" exemption covers materials recycled by application onto roads or ground as, for example, a road base for skid reduction or dust control.[159] EPA asserts regulatory authority over such activities to keep hazardous materials from running off into sewers, groundwater, and the environment.[160]

Similarly, recycled materials are solid waste if they are burned to recover materials or energy, are found in fuels, or are used to produce a fuel—all activities that affect air quality.[161] Materials may also be solid waste when recycled by reclamation,[162] or if they have been "accumulated speculatively."[163] These distinctions are necessary to regulate incineration, reclamation, and accumulation activities and to protect against what EPA calls "sham recycling."[164]

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[153] *Id.* § 261.2(a)(2)(ii).

[154] *Id.* § 261.2(a)(2)(iii).

[155] *Id.* § 261.2(a)(2)(iv). Thus, EPA addresses recycled materials, not as a commodity to be sold or traded, but within the context of solid wastes. Sweeney, *supra* note 117, at 1, 4; *see* discussion *infra* Part II.B.

[156] Am. Petroleum Inst. v. United States Envtl. Prot. Agency, 216 F.3d 50, 58 (D.C. Cir. 2000). EPA's authority over "petrochemical removed oil" used to produce petrochemical products was upheld because EPA correctly excludes, under section 261.4(a)(18)(i), any recovered material that "provides a benefit to the industrial process" and is not merely being discarded "under the guise of recycling." *Id.*; *see* discussion *infra* Part II.B.

[157] 40 C.F.R. § 261.2(b)(1)–(3).

[158] *Id.* § 261.2(c)(1)(i).

[159] *See* Comella, *supra* note 118, at 439; discussion *infra* notes 235–240, 320–323.

[160] EPA considers this to be "sham recycling." Comella, *supra* note 118, at 416–20.

[161] 40 C.F.R. § 261.2(c)(2).

[162] *Id.* § 261.2(c)(3).

[163] *Id.* § 261.2(c)(4).

[164] *See* Sweeney, *supra* note 117, at 5 n.24 (citing Letter from Sylvia Lowrance, Office of Solid Waste, U.S. Envtl. Prot. Agency, to Hazardous Waste Management Directors: Regions I-X, (Apr. 26, 1989) (listing sham recycling criteria)). Sweeney argues that by regulating recycling under solid waste, EPA has it backward; it should adopt the "philosophy that bona fide recycling is the rule, whereas, sham or rogue recycling is the exception." *Id.* at 75. Without empirical evidence, the question turns on which way EPA should risk being

Some materials are "inherently waste-like," and therefore are solid wastes no matter how they are recycled.[165] Few inherently waste-like materials are listed,[166] but the EPA Administrator may also add any materials that match EPA's criteria.[167] If the material is "ordinarily disposed of, burned, or incinerated . . . [or] contain[s] toxic constituents" that are not usually present in the substituted raw material, and it is "not used or reused during the recycling process," it is classified as "inherently waste-like" if it "may pose a substantial hazard to human health and the environment when recycled."[168]

If the material is not a solid waste, RCRA does not apply.[169] The crucial distinctions between recycled solid waste and recycled materials are examined further in Part III.B *infra*.[170] If the material is a solid waste, the next step is to ascertain whether it is also a "hazardous waste."[171]

3. Defining Hazardous Waste

RCRA authorizes EPA to determine when a solid waste is also hazardous, which it has done in a "two-part definition."[172] First, EPA published a list of hazardous wastes, each of which is described and assigned a code.[173] This list is divided into three types, categorized by letter codes: (1) "F" applies to hazardous wastes from unspecified sources;[174] (2) "K" includes hazardous wastes from specified sources;[175] and (3) "P" and "U" designate commercial chemical product, manufactured chemical intermediates, or residues that are "discarded," including off-specification products, whether spilled or in

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wrong. Unless a material is a solid waste, EPA has no authority to regulate it, even if it is hazardous. *See* Conn. Coastal Fishermen's Ass'n v. Remington Arms Co., 989 F.2d 1305, 1313 (2d Cir. 1993); Am. Mining Cong. v. United States Envtl. Prot. Agency, 907 F.2d 1179, 1185 (D.C. Cir. 1990) [*AMC II*].

[165] 40 C.F.R. § 261.2(d)(1)–(3).

[166] *Id.* § 261.2(d)(1)–(2) ("unless used as an ingredient for a product at the site of generation").

[167] *Id.* § 261.2(d)(3)(i)–(ii).

[168] *Id.*

[169] 42 U.S.C. § 6903(5) (2000); *Conn. Coastal Fishermen's Ass'n*, 989 F.2d at 1313; *AMC II*, 907 F.2d at 1185 (quoting *AMC I*, 824 F.2d 1177, 1179 (D.C. Cir. 1987)).

[170] Discussion *infra* Part II.B.

[171] 42 U.S.C. § 6903(5); *Conn. Coastal Fishermen's Ass'n*, 989 F.2d at 1313; *AMC II*, 907 F.2d at 1185 (quoting *AMC I*, 824 F.2d at 1179).

[172] 42 U.S.C. § 6921(b); Am. Petroleum Inst. v. United States Envtl Prot. Agency, 906 F.2d 729, 733 (D.C. Cir. 1990).

[173] 40 C.F.R. § 261 subpart D; *Am. Petroleum Inst.*, 906 F.2d at 733.

[174] 40 C.F.R. § 261.31(a).

[175] *Id.* § 261.32.

containers.[176] P-listed chemicals are deemed "acute hazardous wastes" and thus are more rigorously controlled than U-listed wastes, which are identified as toxic.[177]

Second, a solid waste exhibiting any of the characteristics of a hazardous waste identified by EPA will fall under RCRA's subtitle C regulations.[178] These characteristics are: reactivity (unstable materials which may "react violently, . . . generate toxic gases, vapors or fumes," or explode);[179] ignitability (has a flash point below 140° Fahrenheit, or can cause or exacerbate a fire);[180] corrosivity (could eat through steel or has a pH level at or below 2 or equal to or greater than 12.5);[181] and toxicity (capable of leaching listed contaminants into groundwater above specified levels).[182]

B. *Recycled or Solid Waste: What Does it All Mean?*

Recycled materials can be divided into three categories: those that are solid wastes, but not hazardous; solid wastes that are hazardous wastes under RCRA's subtitle C;[183] and those that are not solid wastes at all, and thus outside the regulatory scheme.[184]

1. When Are Recycled Materials Not Solid Wastes?

Two factors determine whether EPA retains jurisdiction over a recycled material as a solid waste: the type of secondary material being recycled and the recycling method employed.[185] Secondary materials are divided into five main classifications: spent materials, sludges, by-products, commercial chemical products, and scrap metal.[186]

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[176] *Id.* § 261.33.

[177] *Id.* § 261.33(e)–(f); Case, *supra* note 126, at 50.

[178] Am. Petroleum Inst. v. United States Envtl. Prot. Agency, 906 F.2d 729, 733 (D.C. Cir. 1990).

[179] 40 C.F.R. § 261.23.

[180] *Id.* § 261.21.

[181] *Id.* § 261.22.

[182] *Id.* § 261.24; *see* Case, *supra* note 126, at 51.

[183] 40 C.F.R. § 261.6(a)(1)–(2) ("Hazardous wastes that are recycled will be known as 'recyclable materials'" and are regulated in subparts C through O of § 266).

[184] 42 U.S.C. § 6903(5) (2000); Conn. Coastal Fishermen's Ass'n v. Remington Arms Co., 989 F.2d 1305, 1313 (2d Cir. 1993); *AMC II*, 907 F.2d at 1185 (quoting *AMC I*, 824 F.2d 1177, 1179 (D.C. Cir. 1987)).

[185] U.S. ENVTL. PROT. AGENCY, PUB. NO. 530-R-99-046, RCRA, SUPERFUND & EPCRA HOTLINE TRAINING MODULE: INTRODUCTION TO: DEFINITION OF SOLID WASTE AND HAZARDOUS WASTE RECYCLING 5 (2000) (Updated Oct. 1999) [hereinafter RCRA TRAINING MODULE].

[186] 40 C.F.R. § 261.2(c) tbl. 1; RCRA TRAINING MODULE, *supra* note 185, at 5.

"Spent materials" include used solvents, activated carbon, catalysts, and acids that must be regenerated, reclaimed, or reprocessed before they can again serve their original purpose.[187] If spent materials are disposed, recovered for fuel, reclaimed, or speculatively accumulated, they are categorized as solid wastes.[188]

Sludges are wastes resulting from water and wastewater treatment or from air pollution control equipment.[189] Regulated hazardous waste sludges are either listed on the F or K hazardous waste lists, or exhibit a hazardous characteristic.[190] Listed sludges may be those from non-specific sources (F list)[191] or from specific sources, such as wood preservation (K list).[192] If the sludge is not listed, but does have a hazardous characteristic, it may, nonetheless, be reclaimed without regulation,[193] unless it is "generated within [the] primary mineral processing industry" pursuant to section 261.4(a)(17), which conditions the exemption.[194]

The term "by-products" is a catch-all for most remaining wastes that are not classified as spent material or sludges, but does not include primary products or materials that are "solely or separately produced by the production process."[195] By-products are treated like sludges—either listed or exhibiting hazardous characteristics.[196] Sludges are not solid wastes, if reclaimed, unless they fall within section 261.4(a)(17).[197] Co-products, which are materials produced in a form ordinarily used by the general public, are neither by-products nor solid wastes.[198]

Commercial chemical products (CCPs) are broadly defined to include: (1) discarded, off-specification, or unused chemicals; (2) products containing chemicals listed as hazardous in 40 C.F.R.

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[187] 40 C.F.R. § 261.1(c)(1); RCRA TRAINING MODULE, *supra* note 185, at 5.

[188] 40 C.F.R. § 261.2 tbl. 1.

[189] RCRA TRAINING MODULE, *supra* note 185, at 5.

[190] *Id.*

[191] 40 C.F.R. § 261.31.

[192] *Id.* § 261.33.

[193] *Id.* § 261.2(c)(3).

[194] *Id.* § 261.4 (listing exclusions to solid waste categories). "Secondary materials [such as] sludges, by-products, and spent materials" generated by the "primary mineral processing industry" are not solid wastes, provided a list of processing and storage conditions are met. *Id.* § 261.4(a)(17)(i)–(iv). *But see* Ass'n of Battery Recyclers v. United States Envtl. Prot. Agency, 208 F.3d 1047, 1056 (D.C. Cir. 2000) (holding that EPA cannot regulate secondary materials stored for reuse within the generating industry itself).

[195] 40 C.F.R. § 261.1(c)(3).

[196] *Id.* § 261.2(c)(3) tbl. 1.

[197] *Id.*

[198] *Id.* § 261.1(c)(3).

§ 261.33; or (3) chemicals exhibiting hazardous characteristics.[199] For the purposes of solid waste definition, CCPs also include non-chemical, commercial products with a hazardous waste characteristic, such as unused batteries.[200] Surprisingly, CCPs are *not* considered solid wastes if they are recycled by reclamation or are speculatively accumulated.[201] Recycling of CCPs by disposal on land, however, *is* regulated unless such application is the normal use of that chemical, as in pesticide use, for example.[202] Unless it is a fuel to begin with, commercial chemical products are also classified as solid wastes when burned to recover energy, or used to produce fuel.[203]

The final category of potentially regulated secondary materials is scrap metals. Defined as worn or excess pieces of metal parts, such as wire and shavings not excluded by definition,[204] scrap metals are solid wastes if recycled by disposal on land, recovered for fuel, reclaimed, or speculatively accumulated.[205]

EPA's authority under RCRA to regulate recycling does not extend to regular production activities or "normal uses of commercial products," because these are not waste discard activities meaning that the resulting materials are not discarded.[206] EPA does assert jurisdiction over recycling that involves materials that are: (1) burned to recover energy or fuel; (2) disposed on land; (3) used in a product that is disposed on the land; (4) speculatively accumulated; (5) reclaimed; or (6) inherently waste-like.[207]

Although EID might involve any of these methods, the "speculatively accumulated" and "reclamation" designations may be the most common issues bringing an EID project under RCRA's jurisdiction.[208] Unless the production of secondary materials exactly matches the

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[199] RCRA TRAINING MODULE, *supra* note 185, at 6.

[200] *Id.*

[201] 40 C.F.R. § 261.2(c) tbl 1.

[202] *Id.*; 40 C.F.R. § 261.2(c)(1)(ii).

[203] 40 C.F.R. § 261.2(c)(2)(i)–(ii).

[204] 40 C.F.R. § 261.1(c)(6). Excluded scrap metal includes "processed scrap metal, unprocessed home scrap metal, and unprocessed prompt scrap metal." *Id.* § 261.1(c)(9). This exception encompasses scrap metal that has been physically separated to improve handling or increase value, or which is generated either by "steel mills, foundries, and refineries," or by "metal working/fabrication industries." *Id.* § 261.1(c)(10)–(12).

[205] 40 C.F.R. § 261.2(c) tbl. 1.

[206] Sweeney, *supra* note 117, at 6–7 (citation omitted).

[207] 40 C.F.R. § 261.2(c)–(d). Table 1 identifies the four controlled recycling methods as: (1) "Use constituting disposal," (2) "Energy recovery/fuel," (3) "Reclamation," and (4) "Speculative accumulation." *Id.* § 261.2(c). "Inherently waste-like materials" are solid wastes regardless of how they are recycled. *Id.* § 261.2(d).

[208] *See* discussion *infra* Part II.C.1.

quantity required for reuse as a raw material, some accumulation or inventorying of materials may be necessary. Many secondary materials require reclamation to recover useable products, potentially triggering expensive RCRA regulation if the material is listed as hazardous.[209] These recycling exceptions require a closer look to understand how they affect EID.

To protect public health and the environment against improper storage of hazardous waste under the guise of recycling, EPA categorizes secondary materials that are "speculatively accumulated" as solid wastes.[210] If there is no known or feasible recycling market for the material, or if seventy-five percent of the material is not recycled within one calendar year beginning on January 1,[211] EPA assumes authority to regulate it as speculatively accumulated material.[212] Materials "generated . . . in a manufacturing process unit or associated non-waste-treatment-manufacturing unit" are exempted even if accumulation occurs.[213]

Reclaimed spent materials, sludge, and by-products identified in table 1 of section 261.2 and not excluded under section 261.4(a)(17), are solid wastes.[214] Reclamation entails regeneration or processing to remove contaminants and "recover usable product."[215] Direct uses of secondary materials, however, "as ingredients to make new products without distinct components of the materials being recovered as end-products," or "as substitutes for commercial products," are excluded,

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[209] J. Thomas Wolfe of Capital Environmental explains how EPA's listing of vanadium as a hazardous waste created an economic disincentive to vanadium reclamation, claiming that that land disposal of vanadium "became more cost effective" at $200 per ton compared with a cost of "$500 to $800 per ton" to reclaim the catalyst material. J. Thomas Wolfe, *Waste Not*, ENVTL. F., Jan.–Feb. 2002, at 19. He admits, however, that EPA's listing of vanadium resulted from its concern that "about a fifth" of the total vanadium produced went to landfills, potentially releasing "arsenic and benzene into the soil or groundwater." *Id.*

[210] Hazardous Waste Management System; Definition of Solid Waste, 50 Fed. Reg. 614, 634 (Jan. 4, 1985) (to be codified at 40 C.F.R. pts. 260, 261, 264–66) [hereinafter Definition of Solid Waste].

[211] 40 C.F.R. § 261.1(c)(8); Definition of Solid Waste, *supra* note 210, 50 Fed. Reg. at 634.

[212] RCRA TRAINING MODULE, *supra* note 185, at 7. EPA believed Congress intended "accumulated hazardous secondary materials" to be regulated as solid hazardous waste because they are "rarely, if ever, recycled or amenable to recycling" in a way that protects the environment. Definition of Solid Waste, 50 Fed. Reg. at 634. The EPA retains the flexibility, however, to grant variances for speculatively accumulated materials that it deems legitimately recycled. *See infra* text accompanying notes 299–308.

[213] 40 C.F.R. § 261.4(c).

[214] *Id.* § 261.2(c)(3).

[215] 40 C.F.R. § 211.1(c)(4).

however, because they are production, not "waste management," activities.[216]

EPA sets out three categories of "recycled" materials that are not solid wastes, at least at first glance.[217] Materials "used or reused" to make a product are not solid wastes unless reclaimed, or otherwise included under the recycling exceptions.[218] Likewise, materials employed "in a particular function or application as an effective substitute for a commercial product"[219] or returned back into the original generating process are not solid wastes,[220] unless specifically included.[221] The final category, again with certain exceptions,[222] includes secondary materials used in a closed-loop recycling system as a "feedstock" substitute.[223]

The "used or reused" category includes ingredients or intermediates used to make a product, such as the distillation bottoms resulting from carbon tetrachloride production, used to make tetrachloroethelyne, or the production of cement using fly ash.[224] Commercial product substitutions include, for example, the use of pickle juice waste as "phosphorous precipitant and sludge conditioner in wastewater treatment."[225]

EPA retains jurisdiction "even if the recycling involves use, reuse, or return to the original process" for wastes that are disposed or used in products for land application.[226] Wastes that are "inherently wastelike,"[227] "used in a manner constituting disposal,"[228] "burned for energy recovery," used for fuel production or otherwise found in fuels,[229] or "accumulated speculatively"[230] are solid wastes, regardless of how they are recycled.

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[216] Definition of Solid Waste, *supra* note 210, 50 Fed. Reg. at 633.

[217] *See* Comella, *supra* note 118, at 433–36. Comella points out that, after excluding certain materials as solid waste, EPA "changes its mind and states that most of them are . . . solid wastes" because it excludes certain methods, wastes, or processes. *Id.* at 435.

[218] 40 C.F.R. §§ 261.1(c)(5)(i), 261.2(e)(1)(i).

[219] 40 C.F.R. § 261.1(c)(5)(ii).

[220] *Id.* § 261.2(e)(1)(iii).

[221] *Id.* § 261.2(e)(2).

[222] Where "materials are generated and reclaimed within the primary mineral processing industry, the conditions . . . found at § 261.4(a)(17) apply . . . ." *Id.* § 261.2(e)(1)(iii).

[223] *Id.*

[224] *Id.* § 261.1(c)(5)(i); Comella, *supra* note 118, at 434.

[225] 40 C.F.R. § 261.1(c)(5)(ii).

[226] *Id.* § 261.2(e)(1)(iii), (2)(i) ("without first being reclaimed or land disposed").

[227] *Id.* § 261.2(e)(2)(iv) ("listed in paragraph (d)(1) and (d)(2)").

[228] *Id.* § 261.2(e)(2)(i).

[229] *Id.* § 261.2(e)(2)(ii).

[230] *Id.* § 261.2(e)(2)(iii).

These exceptions maintain EPA's authority to regulate hazardous recycled materials or processes, that pose potential harm to public health or the environment, are prone to "sham recycling" methods, or both.[231] The premise that control of sham recycling requires all recycling to be defined under solid wastes is a major source of the criticism that RCRA impedes recycling efforts,[232] echoed even by some EPA and state regulators.[233] EPA retains discretion to determine that a recycling method is legitimate, through exceptions, exemptions, variances, and delisting options.[234]

2. Controlling Hazardous Waste Recycling

Under RCRA, recycled hazardous wastes are "recyclable materials,"[235] which are divided into three categories.[236] The first group includes recyclable materials that are not conditionally exempt, for which generators and transporters of recyclable materials must follow the specified guidelines of RCRA for notification, manifesting, handling, storage, and transportation.[237]

Owners and operators of facilities that store recyclable materials before recycling are more heavily regulated,[238] while those who do not store have significantly fewer responsibilities.[239] The recycling process itself is generally exempt from regulation, although the "[o]wners

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[231] United States v. Marine Shale Processors, 81 F.3d 1361, 1365 nn.3–4 (5th Cir. 1996) (distinguishing "sham recycling" from "legitimate recycling" by focusing on the "purpose or function the hazardous waste allegedly serves in the production process").

[232] For example, in *Marine Shale Processors*, the issue was whether the hazardous material legitimately contributed to the production of aggregate or merely a convenient method of disposal. 81 F.3d at 1365.

[233] OFFICE OF SOLID WASTE, U.S. ENVTL. PROT. AGENCY, BEYOND RCRA: PROSPECTS FOR WASTE & MATERIALS MANAGEMENT IN THE YEAR 2020, at 12 (2001), *at* http://www.epa.gov/osw/vision.htm (last visited Mar. 17, 2002) [hereinafter BEYOND RCRA]. ("Meeting [the goal of waste reduction will] require fundamental changes in the waste vs. non-waste regulatory construct ... [such approaches include identifying] materials as 'wastes' only when they are clearly destined for disposal ....").

[234] *See* discussion *infra* Part II.C.

[235] 40 C.F.R. § 261.6(a)(1).

[236] *Id.* § 261.6(a)(1)–(3).

[237] *Id.* § 261.1(b) (subject to requirements of parts 262 and 263 plus notification requirements).

[238] *Id.* § 261.1(c)(1) ("[R]egulated under all applicable provisions of subparts A through L, AA, BB, and CC of parts 264 and 265, and under parts 124, 266, 268, and 270 of this chapter and the notification requirements ....").

[239] *Id.* § 261.1(c)(2) (notification, and manifest requirements, and subparts AA and BB of part 264 or 265).

and operators of facilities subject to RCRA permitting" must still meet certain requirements.[240]

The next category is only "regulated under subparts C through O" of section 266 and "all applicable provisions in parts 270 and 124."[241] This group includes: (1) hazardous materials that are disposed;[242] (2) burned for energy recovery;[243] (3) provide for the reclamation of precious metals,[244] including reclaimed lead-acid batteries;[245] and (4) site-specific waste from "US Filter Recovery Services XL"(USFRS XL).[246]

The final category includes industrial ethyl alcohol,[247] scrap metal,[248] fuels refined out of "oil-bearing hazardous waste,"[249] certain hazardous waste fuels, and recycled used oil.[250] This category exempts the notification requirements and the regulations under sections 262 through 266, 268, 270, and 124.[251]

Another point worth considering in determining EIP viability is that hazardous waste generators are treated differently depending on size.[252] There are large-quantity and small-quantity generators,[253] with conditional exemptions allowed for certain small-quantity genera-

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[240] *Id.* § 261.6(c)(1). "Owners or operators . . . with hazardous waste management units that recycle hazardous wastes are subject to subparts AA and BB of part 264 or 265 of this chapter." *Id.* § 261.6(d).

[241] 40 C.F.R. § 261.6(a)(2).

[242] *Id.* § 261.6(a)(2)(i) (regulated under subpart C).

[243] Includes activities not regulated in section 264 or 265. *Id.* § 261.6(a)(2)(ii) (regulated under subpart H).

[244] *Id.* § 261.6(a)(2)(iii) (regulated under subpart F).

[245] *Id.* § 261.6(a)(2)(iv) (regulated under subpart G).

[246] *Id.* § 261.6 (a)(2)(v). Effective November 23, 2001, this site-specific regulation implements a project under EPA's Project XL program that tests the "effectiveness of an integrated, flexible, performance-based approach" for resin and other wastes from electroplating operations. In exchange for "regulatory flexibility," U.S. Filter Recovery Services (USFRS) must meet "additional reporting and handling requirements" under subpart O. Project XL Site-Specific Rulemaking for Filter Recovery Services Roseville, Minnesota and Generators and Transporters of USFRS XL Waste, 66 Fed. Reg. 28,066 (proposed May 22, 2001) (to be codified at 40 C.F.R. pts. 261 & 266).

[247] 40 C.F.R. § 261.6(a)(3)(i) (with exceptions for exportation).

[248] *Id.* § 261.6(a)(3)(ii) (not already excluded under section 261.4(a)(13)).

[249] *Id.* § 261.6(a)(3)(iii) ("if such wastes result from normal petroleum refining, production, and transportation practices").

[250] *Id.* § 261.6(a)(3)(iv).

[251] *Id.* § 261.6(a)(3).

[252] Carol Barry, *A Practical Guide to Surviving Multimedia Inspections*, 24 Envtl. L. Rep. (Envtl. L. Inst.) 10,305, 10,309 (1994).

[253] *Id.* (distinguished by whether facility generates more or less than 1000 kilograms of hazardous waste per month).

tors.[254] The reporting and storage requirements for small and conditionally exempt generators are less stringent than for large generators.[255]

3. Judicial "Clarification"?

Many of the significant decisions attempting to distinguish regulated discarded materials from non-regulated products have come out of the United States Court of Appeals for the District of Columbia.[256] The first major case, *American Mining Congress v. United States Environmental Protection Agency* (*AMC I*), limited EPA's authority under RCRA to those materials that were actually part of the "waste disposal problem" and not those which are "destined for beneficial reuse or recycling in a continuous process by the generating industry itself."[257] Thus, if a material was still part of the "ongoing manufacturing or industrial process," it was outside EPA's jurisdiction.[258]

In *American Petroleum Institute v. United States Environmental Protection Agency*, the issue was whether the court's ruling in *AMC I* precluded EPA from regulating the treatment of zinc-bearing waste created in the steel production process because it was no longer "discarded" when it reached a recycling facility.[259] The court determined that the slag was "discarded" before it reached the facility, and since the delivery was "not . . . part of an 'ongoing manufacturing or industrial process' within 'the generating industry,'" but rather "part of a mandatory waste treatment plan," *AMC I* was distinguishable.[260] This ruling expanded EPA's jurisdiction to include materials recycled

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[254] *Id.*

[255] *Id.* A large generator is exempt from having to obtain a storage permit as long as it follows EPA storage guidelines and stores no more than fifty-five gallons of hazardous waste materials, or a quart of acutely hazardous waste, for less than ninety days. 40 C.F.R. § 262.34(a); Barry, *supra* note 252, at 10,309 nn.26–28. In contrast, a small generator following safe storage conditions is exempt from permit requirements for up to 180 days. 40 C.F.R. § 262.34(d); Barry, *supra* note 252, at 10,309.

[256] *See generally* Ass'n of Battery Recyclers v. United States Envtl. Prot. Agency, 208 F.3d 1047 (D.C. Cir. 2000); *AMC II*, 907 F.2d 1179 (D.C. Cir. 1990); Am. Petroleum Inst. v. United States Envtl. Prot. Agency, 906 F.2d 729 (D.C. Cir. 1990); *AMC I*, 824 F.2d 1177 (D.C. Cir. 1987).

[257] 824 F.2d at 1186.

[258] *Id.*; *see* Sweeney, *supra* note 117, at 22–23.

[259] *Am. Petroleum Inst.*, 906 F.2d at 740. Such waste is called K061 slag and is a "zinc-bearing listed hazardous waste that emanates from the primary production of steel in electric furnaces." *Id.* at 734.

[260] *Id.* at 740–41.

outside the generating facility, even if they were later sold as a product.[261]

The following month, *American Mining Congress v. United States Environmental Protection Agency* (*AMC II*) drew a further distinction between "discarded" and "beneficially reused."[262] The court narrowed *AMC I*'s ruling to include only those materials "'destined for *immediate reuse* in another phase of the industry's ongoing process,'"[263] and therefore, the "potential reuse of a material" at some later time, does not prevent EPA "from classifying it as 'discarded.'"[264]

EPA understood the *AMC I* and *AMC II* rulings to mean that it could treat a "secondary material as 'discarded'" whenever the material left "the production process and [was] stored for any length of time"[265] because it was not immediately reused. In *Association of Battery Recyclers v. United States Environmental Protection Agency*, the court disagreed, declaring "material stored for recycling is plainly not in [the waste] category."[266] *Association of Battery Recyclers* placed a different emphasis on *AMC I*'s language,[267] defining "immediate reuse" not as a measure of time, but rather as a direct or sequential part of the industrial process.[268]

The issue involved the "conditional exclusion" for "reclaimed mineral processing secondary materials" which are not solid wastes unless improperly stored.[269] The petitioners challenged EPA's position that a secondary material "held for recycling in production" could be regulated as a "waste" regardless of whether it was stored before it was recycled.[270]

The court agreed with the petitioners, noting that because "[a]t least some of the secondary material [was] destined for reuse as part of a continuous industrial process [it was] not abandoned or thrown away."[271] By attempting to regulate "in-process secondary materials," which are being reclaimed "'*for beneficial reuse or recycling in a continu-*

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[261] *See id.*

[262] *See* 907 F.2d 1179, 1185 (D.C. Cir. 1990).

[263] *Id.* at 1186 (quoting *AMC I*, 824 F.2d at 1185).

[264] *Id.* (citing *Am. Petroleum Inst.*, 906 F.2d at 740–41).

[265] Ass'n of Battery Recyclers v. United States Envtl. Prot. Agency, 208 F.3d 1047, 1052 (D.C. Cir. 2000).

[266] *Id.* at 1052.

[267] *Id.* at 1053–54 ("Later cases of this court do not limit *AMC I* as EPA supposes . . . [and *AMC II*] did not disturb *AMC I*'s interpretation of 'discarded.'").

[268] *Id.* at 1053.

[269] *Id.* at 1051; 40 C.F.R. §§ 261.2(c)(3), 261.4(a)(17) (2001).

[270] *See Ass'n of Battery Recyclers*, 208 F.3d at 1051.

[271] *Id.* at 1056.

ous process by the generating industry itself,'"[272] EPA "acted in contravention of Congress' intent."[273] Thus, storage of in-process, secondary materials, at least the part that is slated for recycling within the generating industry, may be outside EPA's jurisdiction.[274]

The American Petroleum Institute challenged EPA's regulations again in 2000; this time contending that primary treatment of oil-bearing wastewater was intended to recover useable oil as part of the production process, not, as EPA insisted, primarily to prepare for discard in compliance with the Clean Water Act.[275] If conducted as part of a mandatory treatment plan under the *AMC I* analysis, a characterization for which EPA is "entitled to deference," then such treatment could be regulated.[276]

The court noted, however, that "[i]f refiners got nothing from primary treatment" then EPA's assertion would be compelling, but because they recovered a valuable resource, EPA would have to do more than merely conclude that discard was the primary motivation.[277] Further, the relative quantity of oil recovered was not in itself indicative of a primary intent to discard.[278]

The court held EPA's regulation of the primary treatment to be arbitrary and capricious, remanding to the agency in order to: (1) "set forth why it has concluded that the primary motivation predominates over the reclamation motivation"; and (2) even if that conclusion is valid, explain why it "compels the further conclusion that the wastewater has been discarded."[279] Thus, the court suggests that if the intent of the treatment is primarily to reclaim useable product, or if any useable material is recovered from the process no matter how small, EPA may not be authorized to regulate it if used in the generating industry itself.[280]

Other courts have had a hand in clarifying when a secondary material is "discarded." In *United States v. ILCO, Inc.*, for example, the question was whether previously discarded vehicle batteries collected for the beneficial recovery of lead were no longer discarded once they

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[272] *Id.* at 1053 (quoting *AMC I*, 824 F.2d 1177, 1186 (D.C. Cir. 1987)).

[273] *Id.* at 1056 (quoting *AMC I*, 824 F.2d at 1193).

[274] *See id.*

[275] Am. Petroleum Inst. v. United States Envtl. Prot. Agency, 216 F.3d 50, 57–58 (D.C. Cir. 2000).

[276] *Id.* at 57.

[277] *Id.*

[278] *Id.*

[279] *Id.*

[280] *See id.*

were recycled.[281] The Eleventh Circuit agreed with the Court of Appeals for the District of Columbia that a secondary material merely has to have been thrown away at some point to be considered "discarded" not remain in that condition indefinitely.[282]

In *Catellus Development Corp. v. United States*, the Ninth Circuit applied the reasoning from *ILCO* to establish CERCLA liability.[283] General Automotive argued that because they sold used whole batteries as a product to a third party—who then cracked them open, recovered the valuable components, and discarded the casings on Catellus Development Corp.'s property—they should not be held liable.[284] The court stated that General Automotive could not avoid arranging for disposal liability by selling the non-recyclable casings—known to require disposal—along with recyclable lead plates as a product to a third party.[285]

C. *EPA Flexibility: Exemptions, Exceptions, Waivers, and Delisting Petitions*

Further complicating the issue, the regulations provide for nineteen solid waste[286] and eighteen hazardous waste exemptions.[287] EPA also created various conditional exclusions[288] and variances,[289] as well as a procedure to enable delisting of certain materials from the hazardous waste classification.[290]

1. Exclusions and Variances from Solid Waste Classification

The first few solid waste exclusions concern discharges and materials covered by the Clean Water Act and the Atomic Energy Act of 1954.[291] A few industries receive special solid waste exemptions, including those involved in wood preservation[292] and petroleum refinery.[293] Certain materials or processes are individually excluded

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[281] 996 F.2d 1126, 1131 (11th Cir. 1993).
[282] *Id.*
[283] Catellus Dev. Corp. v. United States, 34 F.3d 748, 752 (9th Cir. 1994).
[284] *Id.*
[285] *Id.*
[286] 40 C.F.R. § 261.4(a)(1)–(19).
[287] *Id.* § 261.4(b)(1)–(18).
[288] 40 C.F.R. § 266.20(b).
[289] 40 C.F.R. §§ 260.30, 260.31, 260.33.
[290] 40 C.F.R. §§ 260.20, 260.22.
[291] 40 C.F.R. § 261.4(a)(1)–(4).
[292] *Id.* § 261.4(a)(9).
[293] *Id.* § 261.4(a)(12), (18), (19).

from solid wastes under certain conditions.[294] For example, "[s]pent sulphuric acid used to produce virgin sulphuric acid" is an exclusion, unless it is speculatively accumulated.[295]

Some exemptions conditionally enable recycled secondary materials to avoid solid or hazardous waste classification. For instance, according to the regulations, reclaimed secondary materials that are returned to the original generating process are not solid wastes when they are properly handled.[296] The conditions for this exemption include tank storage for less than twelve months with closed pipe conveyance, and preclude processes involving flame combustion, reclamation to produce fuels, or to produce products "used in a manner constituting disposal."[297] Another example is recycled shredded circuit boards, which are included as solid wastes unless they are properly stored before recovery and free from mercury, nickel-cadmium, and lithium.[298]

The EPA Administrator may also determine that in certain situations the rules classifying recycled materials as solid wastes may be waived without adversely affecting human health or the environment.[299] Waivers, in the form of variances, may be obtained for certain speculatively accumulated and reclaimed materials on a case-by-case basis.[300]

The speculatively accumulated materials variance is renewable annually.[301] The variance may be issued in cases where insufficient amounts of speculatively accumulated materials are recycled,[302] or when reclaimed materials are either reused within their original generating processes,[303] or require further reclamation for complete recovery.[304] The Administrator considers when, whether, and how the material is expected to be recycled in the future, the reason for not meeting the recycling quota, how much has been and will be accumulated, and whether the material handling procedures minimize loss.[305]

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[294] *Id.* § 261.4(a)(5) ("in-situ mining techniques"), (a)(6) (pulping liquors).

[295] *Id.* § 261.4(a)(7).

[296] *Id.* § 261.4(a)(8). *But see* Am. Petroleum Inst. v. United States Envtl. Prot. Agency, 216 F.3d 50, 57–58 (D.C. Cir. 2000).

[297] 40 C.F.R. § 261.4(a)(8)(i)–(iv).

[298] *Id.* § 261.4(a)(14).

[299] 40 C.F.R. § 260.30.

[300] *Id.* § 260.31.

[301] *Id.* § 260.31(a).

[302] *Id.* § 260.30(a) (referencing requirement in § 261.1(c)(8)).

[303] *Id.* § 260.30(b).

[304] *Id.* § 260.30(c).

[305] 40 C.F.R. § 260.31(a)(1)–(5).

Reclaimed materials qualify for a waiver if they are returned back into the generating process from which they originated, as long as the reclamation operation "is an essential part" of production.[306] Factors considered in determining this waiver include: (1) the economic viability of virgin material use; (2) how prevalent the practice is; (3) the risk of loss through handling; (4) the time and distance involved between production and reclamation, if the generator also reclaims the material, and (5) whether the material is returned substantially to its original form and use.[307] Finally, reclaimed material requiring further reclamation may also be excluded from solid waste classification if the resulting material will be "commodity-like."[308]

2. Hazardous Waste Exemptions, Exceptions, and Delisting

After determining that a secondary material is classified as a solid waste, the next step is to ascertain if it is nonetheless deemed "not hazardous waste."[309] In 1988, Congress added the Bevill Amendment[310] to RCRA, requiring EPA to remove a number of wastes from its list, although some have since been replaced.[311] This exception includes "[f]ly ash, bottom ash waste, slag waste, and flue gas emission control waste" from coal and fossil fuel combustion.[312] Other listed exclusions include household waste,[313] solid wastes generated by agricultural means and returned to the soil,[314] mining material returned to the mine,[315] and "wastes associated with the exploration, development, or production of crude oil, natural gas, or geothermal energy."[316]

Some exclusions are industry specific. For example, certain solid wastes containing trivalent chromium generated by the "leather tan-

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[306] *Id.* § 260.31(b).

[307] *Id.* § 260.30(b)(1)–(8).

[308] *Id.* § 260.31(c).

[309] 40 C.F.R. § 261.4(b).

[310] Am. Mining Cong. v. United States Envtl. Prot. Agency, 907 F.2d 1179, 1183 (D.C. Cir. 1990).

[311] Envtl. Def. Fund v. Envtl. Prot. Agency, 852 F.2d 1316, 1319–31 (D.C. Cir. 1988) (discussing the Bevill Amendment, EPA's response, and requiring that certain wastes be relisted).

[312] 42 U.S.C. § 6921(b)(3)(A); 40 C.F.R. § 261.4(b)(4) (except facilities that burn hazardous waste, which are regulated separately under § 266.112).

[313] 40 C.F.R. § 261.4(b)(1).

[314] *Id.* § 261.4(b)(2) (agricultural crops and livestock manure).

[315] *Id.* § 261.4(b)(3).

[316] *Id.* § 261.4(b)(5).

ning and refinishing industry" are excluded,[317] and the mining industry enjoys various exclusions for twenty solid wastes, including slag, process wastewater, and dust.[318] Others, such as cement kiln dust, used oil distillation bottoms for asphalt manufacturing, reclaimed chloroflurocarbon refrigerants, and used oil filters appear aimed at supporting recycling efforts.[319]

Under the "product rule," products "produced for the general public's use" to be placed on land, which contain recyclable materials may not be subject to regulation.[320] To qualify, the recyclable materials must first undergo a "chemical reaction in the course of producing the products" that makes them "inseparable by physical means" and the product must meet applicable land disposal treatment standards.[321] EPA interprets this rule to include the requirement that the recycling of the hazardous waste must be legitimate, and not simply a means to avoid RCRA regulations.[322] "Sham recycling" is distinguished from legitimate recycling by determining whether the recyclable material serves a legitimate function in the process or is "merely along for the ride."[323]

Another option available to EID project planners may be to petition for a site specific delisting of a waste stream material from EPA.[324] Because individual waste streams vary "depending on raw materials, industrial processes, and other factors," a waste that is otherwise hazardous may not be under the conditions existing at a particular facility.[325] Thus, the regulations allow persons "to demonstrate that a specific waste from a particular generating facility should not be regulated as a hazardous waste."[326] For example, in October 2000, Nissan successfully petitioned EPA Region 4 to exclude certain listed alumi-

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[317] *Id.* § 261.4(b)(6).

[318] *Id.* § 261.4(b)(7).

[319] 40 C.F.R. § 261.4(b)(8),(12)–(14).

[320] 40 C.F.R. § 266.20(b).

[321] United States v. Marine Shale Processors, 81 F.3d 1361, 1365 (5th Cir. 1996).

[322] *Id.; see supra* notes 160–164, 231–234 and accompanying text.

[323] *Marine Shale Processors*, 81 F.3d at 1365, 1365–66.

[324] 40 C.F.R. § 260.20(a).

[325] Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Proposed Exclusion, 66 Fed. Reg. 57,918, 57,919 (proposed Nov. 19, 2001) (to be codified at 40 C.F.R. pt. 261) (proposed delisting of up to twenty-four hundred cubic yards per year of F019 (aluminum) waste for Nissan North America, Inc., Smyrna, Tennessee, automobile manufacturing plant) [hereinafter Nissan Proposed Exclusion].

[326] *Id.* Site-specific delisted wastes are located in table 1 of appendix IX of 40 C.F.R. § 264.

num wastes,[327] for its automobile manufacturing facility in Smyrna, Tennessee.

To succeed, the petitioner must show that the facility's waste does not meet EPA's hazardous or acutely hazardous waste criteria, and satisfy the Administrator that no other factors exist requiring such listing.[328] This option is more suitable for larger operations with greater technical and financial resources because submission requirements are likely too expensive for smaller facilities.[329] Additionally, the procedural requirements take time, which smaller operations may not have.[330]

III. Analysis: in the Right Direction

To presume RCRA is an impediment based solely on complexity of the "waste" versus "recycle" analysis would do a disservice to the significant pollution prevention or reduction opportunities eco-industrial development has to offer. The solid waste definition is only one of many relevant factors.

A. *EID Options and Strategies*

Because a number of eco-industrial projects exist, there are obviously waste streams successfully exchanged, with or without RCRA's alleged impediments.[331] Persons seeking to plan an EID should first consider exchanges of secondary materials that are neither solid waste nor hazardous waste because, as indicated, RCRA would not apply at all.[332] This determination is well worth the effort to avoid the regulatory responsibilities.[333]

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[327] *Id.* at 57,919, 57,921 The waste in question is called K019 waste and is listed for its hazardous constituents, hexavalent chromium, and cyanide. *Id.*

[328] 40 C.F.R. § 260.22(a)(1)–(2).

[329] *See* 40 C.F.R. § 260.22. Nissan submitted: (1) a description of its manufacturing and wastewater processes; (2) all material data safety sheets; (3) estimates of sludge to be generated; (4) results of analyses for all chemicals generated for toxicity, ignitability, corrosivity, and reactivity determinations; and (5) dye tracer study results. Nissan Proposed Exclusion, *supra* note 325, 66 Fed. Reg. at 57,922.

[330] After the required studies were completed, Nissan submitted its petition in October 2000. EPA's proposed rule and request for comments were made in November, 2001. Any public hearing (if requested and granted) and final rule with response to comments were still pending as of February, 2002. Nissan Proposed Exclusion, *supra* note 325, 66 Fed. Reg. at 57,918, 57,921.

[331] *See* Waste Wise, *supra* note 79, at 10.

[332] *See* discussion *supra* Part II.A.2.

[333] *See* Comella, *supra* note 118, at 421–27.

Solid waste definition begins with "any *discarded* material" because manufactured products for sale to other businesses or to the public are not regulated under RCRA, whether hazardous or not.[334] EPA does not consider secondary material discarded when it is directly used as a substitute for commercial products or to make new products unless "distinct components" of the secondary material come out at the end as waste.[335]

In *Association of Battery Recyclers v. United States Environmental Protection Agency*, however, the court suggested a narrower EPA authority by stating that because "[a]t least some of the secondary material [was] destined for reuse as part of a continuous industrial process [, it was] not abandoned or thrown away."[336] This language suggests that RCRA would not apply to the "used or reused" secondary material, but only to that which actually did come out as waste.[337]

EIDs, however, could potentially involve secondary materials, deemed "discarded" when "inherently waste-like," or under certain recycling methods.[338] Regulated recycling methods are limited to inherently waste-like secondary materials and methods that involve reclamation, speculative accumulation, incineration to recover energy or materials, involve fuels, or result in a product that is placed on land.[339]

The "discarded" recycling classifications are more limited than they initially appear to be. For example, although the Administrator has the discretion to add to the list of inherently waste-like materials, only a few F-listed items and halogen acid furnace incineration are listed as "discarded."[340] Further, if the F-listed materials are ingredients to make a product "at the site of generation," they are not included.[341] Thus, even if a secondary material contains one of the F-listed wastes, its use within the same EIP site (where it was generated) as an ingredient may arguably takes it out of RCRA's jurisdiction.

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[334] *See* 40 C.F.R. § 261.2(a)(1) (2001).

[335] Definition of Solid Waste, *supra* note 210, 50 Fed. Reg. 614, 633.

[336] 208 F.3d 1047, 1056 (D.C. Cir. 2000).

[337] *See id.*

[338] *See* 40 C.F.R. § 261.2(a)(2)(ii)–(iii). Secondary materials are defined as spent materials, sludges, by-products, commercial chemical products, and scrap metal. *See* discussion *supra* Part II.B.

[339] *See* discussion *supra* Part II.B.1.

[340] *See* discussion *supra* notes 172–182.

[341] 40 C.F.R. § 261.2(d)(1)–(2).

Additionally, certain secondary materials are not considered solid waste by EPA, even when reclaimed or speculatively accumulated.[342] For example, commercial chemical products, which by definition are hazardous, are not solid wastes even when recycling involves reclamation or accumulation.[343] Non-hazardous water, wastewater, and air pollution treatment waste (sludge)[344] are not regulated, and even sludge exhibiting a hazardous characteristic may be reclaimed without triggering RCRA.[345] Finally, the product rule allows hazardous secondary materials to be used for products properly treated for placement on land, such as asphalt or cement, as long as it is a necessary (i.e., legitimate) ingredient of the process.[346]

Thus, in EID planning, restricting exchanged materials and recycling processes to avoid combinations that invoke the solid waste classification is clearly possible. Although limiting participants may present some recruitment difficulties, RCRA avoidance would also be a marketing advantage.[347] Operations can also be designed to avoid speculatively accumulated materials by ensuring that secondary materials have a viable recycling market and will not be stored for longer than one year.[348]

Where the solid waste classification for reclaimed materials or speculative accumulation cannot be avoided, a variance is obtainable.[349] Although EPA's interest in protecting public health against sham recycling broadened the classification of solid wastes by maintaining the waiver option on a case-by-case basis,[350] EPA has the flexibility to facilitate recycling efforts of a legitimate EID.

EPA also either completely excludes or conditionally exempts many types of secondary materials from solid or hazardous waste classifications.[351] Conditional exemptions often place reduced burdens on the regulated parties or completely exclude legitimate recycling methods from regulation, while still protecting against sham re-

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[342] See discussion *supra* notes 208–216.

[343] 40 C.F.R. § 261.2(c) tbl 1.

[344] RCRA TRAINING MODULE, *supra* note 185, at 5.

[345] 40 C.F.R. § 261.2(c)(3) tbl 1.

[346] United States v. Marine Shale Processing, 81 F.3d 1361, 1365 (5th Cir. 1996).

[347] *See* Schlarb, *supra* note 2, at 27 (provides strategies for marketing EIP's, including: (1) the emphasis on improving the firm's environmental image; (2) improved economic performance; and (3) expense reduction through resource sharing).

[348] 40 C.F.R. §§ 261.1(c)(8), 261.2(c)(4).

[349] 40 C.F.R. § 260.31.

[350] *See id.*

[351] 40 C.F.R. § 261.4.

cycling.[352] If certain types of EIDs fall into the RCRA quagmire, EPA should consider exemptions to enable such operations to function economically. In addition, larger facilities or networks could apply for site-specific delisting of a hazardous waste.[353]

Finally, even where RCRA does apply, not all compliance requirements are the same. Small generators have significantly fewer obligations than large generators,[354] so size can be an important factor in determining RCRA responsibility. For EIPs the "cradle-to-grave" manifesting requirements could be relatively simple if the majority of the secondary materials were reused onsite.

B. *Targeted Flexibility and Future Possibility*

Recent EPA trends towards flexibility and practical solutions may have particular application for eco-industrial development.[355] The flexibility provided to a number of special projects under Project XL can be applied to the EIP concept.[356]

For example, site specific "case-by-case" deferrals of RCRA standards provided to the Crompton Corporation in Sisterville, West Virginia,[357] may similarly be applied to specific EID projects that meet Project XL's waste-minimization/pollution-prevention targets. EPA is currently considering variances or delisting approval for recycling of low level toxic sludge at Hadco Corporation's Salem, New Hampshire facility,[358] and a "facility-wide cap on air emissions" at Intel's Ocotillo site in Chandler, Arizona.[359] EPA anticipates using successful Project XL pilots as models for other similar applications.[360]

EPA is also considering the possibility of new regulatory approaches to distinguish waste from raw materials.[361] Toward the end of 2001, the EPA Office of Solid Waste requested public comments on its

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[352] *See* discussion *supra* Part II.C.1.

[353] *See* discussion on Nissan delisting *supra* notes 324–330.

[354] Barry, *supra* note 252, at 10,309.

[355] *See* PROJECT XL DIRECTORY, *supra* note 47, at 1 ("testing sensible, flexible solutions to specific obstacles faced by a facility . . .").

[356] *See id.* at 19, 36, 40.

[357] *Id.* at 19.

[358] *Id.* at 36.

[359] *Id.* at 40.

[360] *Id.* at 2 ("In fact, Project XL's greatest opportunity, and its greatest challenge, is taking successful ideas from individual pilot projects and moving [them] to their appropriate system-wide practice and into EPA's everyday way of doing business.").

[361] BEYOND RCRA, *supra* note 233, at 8 (as materials currently considered waste are "used to produce new materials and products" the regulatory waste/material distinction may "become less meaningful").

draft discussion paper, *Beyond RCRA: Prospects for Waste & Material Management in the Year 2020,* which, among other things, suggests new approaches in waste/products analysis as technology and market incentives introduce new strategies for recycling and reuse.[362]

One interesting possibility would be for EPA to classify secondary materials exchanged within a closed-loop EIP as materials "destined for beneficial recycling within a continuous process" under the *AMC I/Association of Battery Recyclers/American Petroleum Institute* analysis[363] rather than a "waste disposal problem."[364] When Congress enacted RCRA, its stated goals included the encouragement of recycling, pollution prevention or reduction, and non-land disposal methods of dealing with wastes.[365]

Association of Battery Recyclers reaffirmed that Congress did not give EPA authority over by-products of industrial processes that are recycled, at any time, back into the process of the generating industry itself.[366] The latest *American Petroleum Institute v. United States Environmental Protection Agency* case also suggests a narrowing of EPA's authority to regulate reclamation where a useable resource is recovered within the same generating industry.[367] First the court considered whether the intent was primarily to discard or to recover the useable material,[368] which should be good news for EID. Even more interesting is the suggestion that intent may be irrelevant: the process or treatment within the generating industry where the usable material is recovered is outside EPA's jurisdiction unless EPA can justify why it should not be.[369] If this is the case, then within the same EIP, treatment at one facility to recover material useable directly for production at another should not be treated as waste management. Unless narrowly drawn, however, this interpretation could detrimentally affect EPA's ability to control "sham recycling."

Where EIPs must be regulated under RCRA, umbrella or "bubble" permitting could simplify the process.[370] Rather than requiring

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[362] *Id.*

[363] Am. Petroleum Inst. v. United States Envtl. Prot. Agency, 216 F.3d 50, 57–58 (D.C. Cir. 2000); Ass'n of Battery Recyclers v. United States Envtl. Prot. Agency, 208 F.3d 1047, 1053 (D.C. Cir. 2000) (quoting *AMC I,* 824 F.2d 1177, 1186 (D.C. Cir. 1987)).

[364] *AMC I,* 824 F.2d at 1186.

[365] *See* 42 U.S.C. § 6902 (2000).

[366] 208 F.3d at 1056–57.

[367] 216 F.3d at 57–58.

[368] *Id.*

[369] *Id.*

[370] *See* discussion *supra* note 48.

each facility to apply for individual permits, EPA could potentially issue a single permit for the entire park, similar to the Intel Project XL.[371] A park corporation established for that purpose could be responsible for all reporting requirements. Conceivably, cost incentives would sufficiently offset the risks of shared liability.[372] Such an arrangement would also naturally encourage self-policing because each "shareholder" would have a stake in mutual compliance.

CONCLUSION

To categorically state that RCRA is a barrier to eco-industrial development, or that such projects are doomed to fail in the U.S. without regulatory restructuring of RCRA, is simply unfounded. First, for RCRA to even apply, the recycled secondary material must be a solid waste, must be hazardous, and must involve one of the regulated secondary materials and recycling methods. Considering the exclusions and exemptions, there appear to be many unregulated recycling possibilities. Second, RCRA's recycling-as-solid-waste definitions are designed to restrict unsafe methods of recycling, not legitimate recycling.

The type of eco-industrial project proposed affects the analysis. EIPs can be designed to avoid or significantly limit regulatory requirements. Where the materials are recycled on site, in a closed-loop process, RCRA may not apply at all, or have limited application. Smaller facilities generating nominal amounts of waste at the end are significantly less regulated than larger sites.

On the other hand, larger industries seeking ways to recycle existing hazardous waste streams may need to be more innovative and environmentally conscientious to avoid the need for RCRA regulation. Where the proposal is not simply a way to dodge RCRA requirements through creative hazardous waste disposal, EPA offers flexibility through variances, waivers, a delisting option, and Project XL pilot programs. The potential economic benefits of reduced disposal costs, new product sales, reduced regulatory burdens, and improved public relations may be well worth the investment.

Those seeking proactive ways to reduce or minimize pollution should give serious consideration to the EID concept. Whether starting from scratch or legitimately recycling existing solid or hazardous waste streams, there are many options available within and outside of

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[371] PROJECT XL DIRECTORY, *supra* note 47, at 40.

[372] *See* discussion *supra* Part I.B.2.

RCRA's regulatory structure. Perhaps it is time for industry to match EPA's efforts toward flexibility.