August 6, 2002

RCRA Docket Information Center
Office of Solid Waste (5305G)
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue NW
Washington, D.C. 20460-0002

RE: State Research, Development and Demonstration Permits for MSW Landfills
Proposed Rule-Making – 40 CFR §258.4
Docket No. F-2002-RDMP-FFFFF

To Whom It May Concern:

This is to submit the attached comments in opposition to the proposed rule, 40 CFR §258.4, that would, under the ruse of encouraging innovation, effectively deregulate the minimum national landfill standards that were promulgated during the 1990's by the Environmental Protection Agency (EPA) pursuant to the Resource Conservation and Recovery Act (RCRA).

We oppose this proposal as both illegal as a matter of law and wrong as a matter of policy. For the innovation that the Agency's states the new rule is intended to encourage is already lawfully and more appropriately met by an existing rule, 40 CFR §258.40(e), which provides a functioning mechanism to process *bona fide* innovations without tearing apart the essential fabric of RCRA.

Our detailed comments are attached.

Sincerely,

William Sheehan, PhD, Executive Director
GRASSROOTS RECYCLING NETWORK

Allen Hershkowitz, PhD, Senior Scientist
NATURAL RESOURCES DEFENSE COUNCIL

Brent Blackwelder, President
FRIENDS OF THE EARTH

Comments in Opposition to Proposed Rule
by the Grassroots Recycling Network, the Natural Resources Defense Council and Friends of the Earth
Submitted to the U.S. Environmental Protection Agency
In Its Docket F-2002-RDMP-FFFFF

State Research, Development and Demonstration Permits for MSW Landfills

August 9, 2002

INTRODUCTION

The proposed rule would delegate to the States the power to substitute alternative standards for most of the national minimum landfill criteria that were promulgated by the Environmental Protection Agency (EPA) pursuant to the Resource Conservation and Recovery Act (RCRA).

EPA claims that extending the power to issue research, development and demonstration (RD&D) landfill permits to the States is intended to encourage innovation. The commenters demur and show why the true intent of the proposed rule is to remove federal standard setting over the design and operation of municipal solid waste (MSW) landfills.

The commenters oppose this attempt to deregulate EPA's role over establishing criteria for landfill design and operation as illegal as a matter of law and wrong as a matter of policy.

As it pertains to the law, the proposed rule would delegate to the States the power to effectively waive minimum national landfill standards, violating the letter and intent of RCRA.

As it pertains to policy, the rule would disperse the terms by which research on new landfill designs or operating conditions are conducted across the country, thereby disrupting any ability to rationally coordinate tests and protocols and making it impossible to produce scientifically valid data to use as the basis for future amendments to the rules.

ARGUMENT

I
The Proposed Rule Is Unlawful

A. The Proposed Delegation of Standard Setting to the States Is Unlawful

The proposed rule purports to be designed to encourage innovation and be limited to a small number of permits for that purpose.[1] In fact, however, if promulgated, the rule would effectively delegate to 49 States and territories with approved plans the authority to issue to virtually any applicant a permit for any new or expanded municipal landfill that can violate almost any of the design, operating or cover criteria set forth in the Agency's minimum federal landfill standards.[2]

To replace minimum federal standards with State waivers, all that is needed is for any ersatz "innovation" to be contrived by the applicant, and for the State to self-certify without any outside oversight that the terms in its order are, in some unspecified manner, equivalent to the federal standards.[3]

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[1] 67 FEDERAL REGISTER 39663 (June 10, 2002).

[2] 40 CFR PART 258, SUBPARTS C, D and E.

[3] Proposed 40 CFR 258.4(a) and (b). Under the proposed rule the only federal standards that seem to remain in effect as non-waivable for RD&D permits are limitations on the receipt of some hazardous wastes, which is included in the operating criteria, and the site restrictions, monitoring requirements, financial assurance criteria and some of the post-closure care rules.

However, the language used is so loose and unclear that is difficult to be certain whether even token equivalence to the Subtitle D standards is actually being suggested ("must include such terms and conditions at least as protective as the criteria *in the part* [sic] to assure protection...")

Moreover, the inconsistent wording used in the proposed rule is so confusing that it ambiguous whether many of the parts of the national standards ostensibly removed from the power of States to waive by virtue of their not being enumerated in the waiver subsection (a) – namely monitoring, financial responsibility and post-closure care – are, in the end, waivable as well. For, although 40 CFR §258.4(a)(1)-(3) seems intended to limit State waivers to the criteria EPA established relating to design, operating (except for hazardous materials) and cover requirements, §258(b)(3) could be read to suggest that these, too, may be waived if the State permit includes "such requirements as [the State deems] necessary to protect human health and the environment (including but not limited to, requirements regarding monitoring, design, operation, financial responsibility, closure and post-closure, and remedial action)."

Apart from the language problems, this delegation over standard setting is in stark contrast to the complete lack of delegation to the States over setting national minimums in the current rules *See*, 40 CFR 239.6(e), that states:

"(e) For municipal solid waste landfill units, state law must require that:
(1) Prior to construction and operation, all new municipal solid waste landfill units shall have a

(continued...)

Certainly, the physical collection and disposal of waste and the enforcement of those federal standards is primarily a State or local function.[4] But, the question addressed in this section of these comments is whether delegation to the States of the power to set national criteria for landfill design or operation through waivers for unsubstantiated alternatives is authorized under RCRA, regardless of whether they are self-servingly labeled as innovative.

1. Four Parts of the Rule Demonstrate Its True Intent to Delegate Standard Setting to the States Rather Than to Stimulate Bona Fide Innovation

Four parts of the proposed rule demonstrate conclusively that the rule is about effective deregulation to the States of the power to set minimum landfill standards, not about encouraging innovation.

a. No EPA Oversight

No EPA oversight is provided in the proposed rule of the State RD&D permit process. First, oversight is absent to confirm that the application, in fact, involves something sufficiently innovative to actually "stimulate the development of new technologies and alternative operational processes,"[5] or that the terms in the State RD&D permit waiving compliance with EPA criteria really are "as protective" of the federal standards that have been put aside.[6]

Second, although the proposed rule instructs States to require certain annual reports summarizing monitoring data,[7] EPA is not specified as a recipient of the summaries, or even notice that a State RD&D permit, with whatever waivers it contains, is pending or has even been granted.

Third, with EPA ignorant of what is about to or has transpired, it is difficult to discern how public participation in this program, with its additional salutary oversight function recognized in law, is to be "encouraged", as RCRA mandates, especially among national public interest organizations.[8]

Without any oversight, and in the absence of any defined means of insuring equivalence, States are essentially left to use whatever standards they choose, as if the federal minimum

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[3] (...continued)
permit incorporating the conditions ... [to] ensure compliance with 40 CFR Part 258...."

[4] 42 USC §6901(4).

[5] 67 FEDERAL REGISTER 39663 (June 10, 2002).

[6] Proposed 40 CFR §258.4(b).

[7] Proposed 40 CFR §258.4(b)(4).

[8] 42 USC §6974(b)(1).

landfill standards mandated by RCRA no longer exist.

b. No Definition or Oversight of Innovation

Since there is no definition of the word "innovative" in the rule,[9] and no federal oversight of the interpretation of the undefined word by a State, virtually any application that includes the word could be construed as being innovative. Therefore, this ostensible requirement, in fact, is not a limitation to *bona fide* innovative projects at all.

One further dispositive fact needs to be emphasized in regard to whether the rule really has anything to do with the encouragement of innovation, and that is this. It is completely unnecessary to adopt the proposed rule in order to facilitate innovation, if that and not deregulation is what is sought.

For the existing rules already provide an ample avenue for innovative designs that vary from the prescriptive designs in the code to be allowed.[10] The only difference is that existing rule requires the EPA to make the decision whether an alternative approach provides equivalence to the national minimums, rather than delegating that standard setting power to the States. This existing rule, then, properly completes the circle from the field where the innovations are developed, to the EPA, where they are vetted and approved, in order to insure that there remains a national program in which base standards and valid alternatives are determined in accordance with federal protections, not in a chaotic patchwork of 50 different State rulings going in different directions.[11]

EPA lists four examples of innovations that, it claims incorrectly, show the need for the proposed rule.[12] The first example is improvements in liner design. Inasmuch as EPA has already used §258.40(e) to consider a clay-only liner,[13] it obviously could do so for an improved liner. The second example relates to improvements in the design of leachate collection systems, and again, like improved liners, there is no reason to believe that the procedures in §258.40(e) could not be used to process that as well. The third and fourth examples relate to bioreactors. EPA has counted 24 bioreactor experiments already ongoing to foster innovation in accelerated decomposition that were approved at a time when the proposed rule did not exist. Many of them have been authorized under EPA's existing eXcellence and Leadership program (XL) and another under a Cooperative Research and Development Agreement (CRADA). Both provide wide and extensive opportunities to foster innovation, but are superintended by EPA and not

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[9] Proposed 40 CFR §258.4(a)

[10] 40 CFR §258.50(e).

[11] 40 CFR §258.40(e)(3). EPA also has specific initiatives programs geared to encouraging innovation and entrepreneurial responses in its XL projects and CRADA programs that are described later.

[12] 67 FEDERAL REGISTER 39664 (June 10, 2002).

[13] *Yankton Sioux Tribe v. EPA*, 950 F. Supp. 1471, 1476 (D.C.S.D. 1996).

delegated to the States without oversight.[14] The fifth example, to employ new techniques that can, for the first time, directly measure leachate head depth is of critical importance, especially since most landfills do not collect that data. Again, it is impossible to imagine how §258.40(e) is unequal to the task of duly approving this additional level of regulation. Certainly, EPA, which is the movant here, has provided no explanation why the existing code is inadequate.

Since the current code already provides a legally valid pathway to constructively respond to innovation, the proposed rule is not really about encouraging innovation within RCRA's boundaries, but rather instead about effectively abandoning EPA's standard setting obligations.

c. Equivalence Neither Defined nor Reviewed

The proposed rule contains a putative requirement that, if the State provides alternative conditions in an RD&D permit to those otherwise required by EPA's minimum standards, they must be "as protective" as those minimums.[15] However, beyond the numerous typographical and grammatical mistakes, that is all the rule provides. There is nothing in the section specifying how equivalence is to be shown. Since the State is authorized to devise any process it chooses to do so without federal oversight, essentially the States are given *carte blanche*.

Even if, for the sake of argument, the rule did attempt to lay out a process how self-verification would check itself, the task would defy meaningful resolution. For computer modeling, which is typically used to project whether a design or operating standard protects groundwater, does not, in fact, provide an objective, self-enforcing mechanism to prevent State action that might violate RCRA. Nor does it render State action into a mindless ministerial act that does not require oversight to prevent the kind of "creative" engineering we have seen in the accounting world in recent months. Yet all that is precisely what would be needed to make the proposed rule's vacuous admonitions functional.

EPA's existing landfill rules start with an overall performance criteria intended to protect health and the environment. This takes the form of groundwater standards that are not be

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[14] 67 FEDERAL REGISTER 36463 (May 23, 2002). Project XL is, according to EPA's website, a national pilot program that allows state and local governments, businesses and federal facilities to develop with EPA innovative strategies to test better or more cost-effective ways of achieving environmental and public health protection. In exchange, EPA will issue regulatory, program, policy, or procedural flexibilities to conduct the experiment. CRADA represents joint agreements between private industry and EPA's Office of Research and Development to conduct research together on issues of common concern. Although bioreactors are currently prohibited by EPA rule, the Agency has approved tests under the XL program for the Buncombe (NC), Yolo County (CA), King George (VA), Maplewood (VA) and Anne Arundel County (VA) landfills, and under CRADA for the Outer Loop landfill (KY).

[15] Proposed 40 CFR 258.4(b). "Any permit issued under this section must include such terms and conditions as [sic] least as protective as the criteria in the part [sic] to assure protection of human health and the environment."

exceeded due to leachate leaking from a landfill.[16] The Agency modeled one set of prescriptive standards, including such things as the physical characteristics of liners and layout of leachate collection systems, which it calculated, will meet those performance criteria. This gave landfill engineers a "cookbook" for a design they can be assured of being approved without having to independently validate each of its provisions. The purpose of the related performance based escape clause in the code referred to earlier, incidently, is to provide a procedure for approval by EPA of alternative designs that it finds also meet the performance criteria.

But, these models do not neutrally provide objective answers that would make delegation to the States roughly equivalent to federal decision making about which prescriptive measures meet the performance criteria. For, in fact, the results of the models all depend upon arbitrary assumptions from whomever is performing the run for many of the input values. This makes the assessment entirely dependent on the user's orientation.

This was illustrated in a case involving the Yankton Sioux Tribe.[17] As described by the Court, the applicant's engineering consultant confidently concluded from its run of the HELP model that a composite part plastic/part clay liner required in the EPA's Subtitle D rules was not necessary. The consultant found that a clay liner by itself would adequately protect groundwater, a claim subsequently endorsed by the State.[18] But, because the proposed rule was not in effect at that time, the State could not self certify a new set of standards that permitted clay only liners, and the EPA was asked to rule. The EPA performed its own run of the HELP model with different assumptions, and it concluded that eliminating the plastic layer on top of the clay liner would "increase risk...of leakage." In fact, that conclusion would have led the Agency to deny the permit had the affected public not stated its willingness to accept that additional risk.[19]

Moreover, neither could the removal of federal oversight be remedied by taking field measurements of emissions and effluent from the facility in operation to determine whether the environment is being adequately protected in fact.

For example, with regard to the leachate collection system, in order to insure that it is performing its job of removing liquids that accumulate at the bottom of the landfill, the rules require that there be no more than 1 foot of leachate over the liner. However, no direct or even indirect measurements are required to insure that it is met and the physical ability to reliably take direct measurements has yet to be demonstrated.[20]

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[16] 40 CFR §258.40(a) and Table 1.

[17] *Yankton Sioux Tribe v. EPA*, 950 F. Supp. 1471 (D.C.S.D. 1996).

[18] *Id.*, at 1476.

[19] *Id.* at 1477.

[20] 40 CFR §258.40(a)(2). The absence of any requirement to directly measure the head over the leachate collection system ought not be confused with the requirement at the design approval phase to show

(continued...)

With regard to the liner system, in order to retard the movement of leachate that accumulates at the bottom of the landfill from leaking into the underlying aquifer, a liner is required that needs to be functional for the long length of time that the waste load remains a threat to the environment. But, there are no requirements to assess or determine whether the materials' expected useful life will extend for the period of time the waste load remains a threat. Moreover, it would be difficult to do so in view of the fact that the few studies of how long it takes garbage to be stabilized in a lined landfill suggest that this may take 300 years or more.[21]

With regard to monitoring groundwater contamination, at least here there are specific standards in place accompanied by a requirement that monitoring wells be installed at the site boundary to establish an early warning system. Unfortunately, however, even this edifice is based upon flawed engineering. For the monitoring wells are generally 150 meters from the direction the groundwater will flow from the landfill and no more than 200 feet apart.[22]

This system might have worked as an early warning signal in the pre-Subtitle D era of unlined landfills that relied upon "natural attenuation" when these monitoring regimens were first developed. For leaks from unlined landfills produce very large, generalized plumes that will be detected by almost any deployment of wells.

However, neither unlined, nor clay-only liners, are any longer considered an adequate barrier to the migration of leachate from the landfill into the groundwater. Current standards require composite polymer/clay liners, and plastic sheets tend to shear in at a single location. Consequently, the plume from a small tear will tend to be very narrow and finger like in shape. A typical two-foot long tear or rip would be expected in a sand aquifer system to spread laterally to only about ten feet within 150 meters of the source. The probability of such a tendril-shaped leak through a composite liner being detected, when the wells are 200 or more feet apart and have a detection radius of perhaps 1-foot, is low.[23]

The proposed rule provides a mechanism that is the functional equivalent of the State making the determination of what landfill standards are the minimum necessary to insure that "there is no reasonable probability of adverse effects on health or the environment," in the place of the EPA Administrator, all without any federal oversight.

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[20] (...continued)
with theoretical modeling that the pipes are designed to keep the head less than one foot. That model has no relation to how a particular system is actually functioning.

[21] 40 CFR §258.40(b).

[22] 40 CFR §258.51.

[23] J. Cherry, "Groundwater Monitoring: Some Deficiencies and Opportunities," Hazardous Waste Site Investigations: Towards Better Decisions, *Proc. 10th ORNL Life Sciences Symposium,* Gatlinburg, TN, May 1990. H.. Haitjema, "Ground Water Hydraulics Considerations Regarding Landfills," 27 *Water Res. Bull.* 791-796 (1991). G. Fred Lee. "A Groundwater Protection Strategy for Lined Landfills," 28 *Environmental Science & Technology* 584 (1994).

d. Permit Duration for 12 Years Longer Than a Test

The RD&D permit may be issued for up to 12 years.[24] This is sufficiently long to extend far beyond a true test for most of the questions under consideration to encompass the entire lifetime of a large proportion of landfill operations, and of the life of the remaining cells at many more facilities.[25]

A comparison of this 12 year time period (an initial 3 year permit followed by three more 3 year extensions) to an earlier EPA RD&D program for hazardous waste demonstrates further evidence that this proposal is not about research or testing, but about State delegation over standard setting. For the existing rule for encouraging innovation in the treatment of hazardous waste is limited to only 4 years (an initial 1 year permit followed by three more 1 year extensions). Also, and of key importance, the existing rule confines the power to issue RD&D permits to the EPA Administrator. [26]

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Taken all together, these four parts of the rule mean a State could permit a landfill to be constructed without the following critical components. All that would be required would be a contrived claim to innovation and manipulation of the computer models, without the EPA even knowing that all this is going on.

Examples of Landfill Criteria That Could Be Waived

- Daily cover on the working face necessary to prevent the spread of disease, or to control fires or odors;[27]
- A composite geomebrane/two foot compacted clay liner, or any liner;[28]
- A leachate collection system;[29]
- Sidewalls with slopes limited to 3:1, or any reasonably shallow angle;
- A run-off abatement system to prevent the discharge of pollutants into waters or

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[24] Proposed 40 CFR 258.4(b)(1) and (d). Also, since the rule is silent on how vertical and lateral expansions at a landfill are to be treated, and federal oversight is removed, one can readily imagine that some States may treat cells constructed as part of such an expansion as re-starting the clock ticking all over again for another 12 year run.

[25] Proposed 40 CFR 258.4(b)(1) and (d).

[26] 40 CFR 270.65(a)(1) and

[27] 40 CFR §258.21.

[28] 40 CFR §258.40(b).

[29] 40 CFR §258.40(a)(2)

wetlands;[30] or

- Restrictions on public access needed to prevent illegal dumping of hazardous materials into the landfill.[31]

Indeed, the *Yankton* case[32] demonstrates the very kinds of inappropriate pressures that can arise at the local level, and the political interference that can be induced to intrude, in order to reduce costs for the landfill owner without regard to the negative impacts on the health and environment that RCRA was enacted to protect.

2. RCRA Does Not Permit Delegating Standard Setting to the States

Even if Congress had not explicitly written a bar to State delegation over standard setting into RCRA, the Courts have held that the absence of an explicit bar may not be construed as implicitly authorizing an agency to take that act. "[W]ere courts to *presume* a delegation of power absent an express *withholding* of such power, agencies would enjoy virtually limitless hegemony, a result plainly out of keeping with *Chevron* and quite likely the Constitution as well."[33]

But, exactly the opposite is the case here. The law is explicit and clear as to its intent. RCRA acknowledges that the States have the primary role in the physical collection of solid wastes. But, the Act then proceeds to note that "*the problems of waste disposal... have become a matter national in scope* and in concern and necessitate Federal action...in the development, demonstration and application of new and improved methods and processes to reduce the amount of waste and unsalvageable materials and *to provide for proper and economical solid waste disposal practices*."[34]

Not only does the RCRA and the later Hazardous and Solid Waste Amendments of 1984 (HSWA) not authorize delegation of standard setting to the States, they create a fabric of national regulation antithetical to everything contemplated by the proposed rule that delegates the power to waive standards promulgated by the EPA:

> "...*[T]he Administrator [of EPA]* shall promulgate regulations containing criteria for determining which facilities shall be classified as sanitary landfills and which shall be classified as open dumps...[which are prohibited]. At a minimum, such criteria shall provide that a facility may be classified as a sanitary landfill and not an open dump only

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[30] 40 CFR §258.26.

[31] 40 CFR §258.25.

[32] *Yankton Sioux Tribe v. EPA*, 950 F. Supp. 1471 (D.C.S.D. 1996).

[33] *Backcountry Against Dumps v. EPA*, 100 F.3d 147 (D.C.Cir. 1996)(italics in text).

[34] 42 USC §6901 (4)(emphasis added).

if there is no reasonable probability of adverse effects on health or the environment from disposal at such facilities."[35]

As further stated by EPA in the FEDERAL REGISTER when it promulgated the minimum federal landfill standards:

> "Subtitle D of RCRA establishes a framework for Federal, State and Local government cooperation in controlling the management of nonhazardous solid waste. *The Federal role in this arrangement is to establish the overall regulatory direction, by providing minimum nationwide standards for protecting human health and the environment...These subtitle D Criteria establish minimum national performance standards necessary to ensure that 'no reasonable probability of adverse effects on health or the environment will result from solid waste facilities or practices.* A facility or practice that meets the Criteria is classified as a 'sanitary landfill.' A facility failing to satisfy any of the Criteria is considered an 'open dump' for purposes of State solid waste management planning...that must be clos[ed] or upgrade[ed]..."[36]

The clear and unambiguous statutory framework in RCRA and HSWA clearly contemplates that minimum national standards for landfill are to be established by the EPA, and then the permitting process implemented by the States within the confines of those criteria. Authorizing the States to waive many of those federal minimums and to further do so without EPA oversight — whether to ostensibly encourage innovation or for any other collateral purpose — violates the clear language and intent of the law. Furthermore, the fact that innovation can be achieved under the existing regulations, which confers the power to substitute alternative criteria when EPA finds that they conform with the related performance standards, makes unmistakable that the sole issue for resolution is whether delegation to the States is permissible.

The statutory basis that EPA cites in the Federal Register as its authority to delegate standard setting to the States[37] do not do so. Indeed, several of their citations speak instead to national standard setting. SECTION 6907, as an example, actually does the opposite of delegating standard setting by requiring EPA to "provide minimum criteria to be used by the States."[38] SECTION 6912(a) is irrelevant to the issue at hand. SECTION 6944 (which is to be read in conjunction with SECTION 6943) again speaks to the opposite effect, that EPA "shall promulgate regulations containing criteria for determining which facilities shall be classified as sanitary landfills and which ...as open dumps...[and each state] plan shall...contain requirements that all solid waste...shall be disposed of in sanitary landfills [constructed and operated in accordance

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[35] 42 USC §6944(a).

[36] 56 FEDERAL REGISTER 50979 (October 9, 1991) (emphasis added). This language is repeated in the preamble to this proposed rule. 67 FEDERAL REGISTER 39663 (June 10, 2002).

[37] 67 FEDERAL REGISTER 39663 (June 10, 2002).

[38] 42 USC §6907(3).

with the federal criteria]." SECTION 6945(c) deals with procedures for handling hazardous waste;[39] as does SECTION 6949a.

EPA, it ought to be noted, does not enjoy deference from the courts in resolving these sorts of challenges. Although the courts have shown deference to EPA's rules when the issue involves the Agency's exercise of its technical expertise, that deference is not shown in matters of law involving such things as jurisdiction[40] and the power to delegate.[41]

Nor can EPA find refuge in a section of its existing hazardous waste rules that is intended to encourage innovative approaches to handling toxic substances, as it claims serves as some sort of precedent for this proposal, which it further notes was "modeled on the research, development and demonstration permit provisions in the Subtitle C" regs.[42] In fact, however, that earlier code provision expressly confines the power to waive the federal hazwaste criteria to the EPA Administrator— and does not extend that power to the States acting without oversight — and even then, only for a total of 4, not the 12 years in the proposed rule.

B. The Proposed Rule Constitutes an Unlawful Attempt to Circumvent NEPA

In another landfill rule-making docket, No. F-2000-ALPA-FFFFF, EPA requested comments on various questions concerning bioreactor landfills.[43]

By letter dated October 4, 2000, the National Recycling Coalition, as part of its comments, petitioned the EPA to prepare an environmental impact statement (EIS) as part of its rule development that considers the alternative of source separating decomposable organic material for composting instead, as a simple and elegant alternative strategy to deal with the intractable problems managing decomposable material in landfills. This parallels what we already successfully do when we separate our bottles, cans and newspapers for recycling. A copy of that letter is appended as ATTACHMENT A and incorporated herein as if set forth in full and adopted by the signatories to this letter. To date, EPA has not replied to the NRC's letter, except to informally indicate that it does not feel any requirement to prepare an EIS until and unless it proceeds to rule-making.

Inasmuch as the current EPA rules bar outside liquid additions essential for bioreactor

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[39] 42 USC §6445(c).

[40] *Yankton Sioux Tribe v. EPA*, 950 F. Supp. 1471, 1479 (D.C.S.D. 1996).

[41] *Backcountry Against Dumps v. EPA*, 100 F.3d 147 (D.C.Cir. 1996).

[42] 67 FEDERAL REGISTER 39664 (June 10, 2002), citing 40 CFR §270.65.

[43] 65 FEDERAL REGISTER 18014 (April 6, 2000)

operation,[44] while many private landfill operators have indicated a desire to pursue bioreactors in order to save landfill space, presumably applicants with bioreactor proposals will be very attracted to pursuing a RD&D permit from those State where conditions are often expected to be less stringent than from EPA. Consequently, the proposed rule may delay the date that EPA otherwise would have intended to repeal its current bioreactor prohibition. For the demand for bioreactor permits could be met by States with standards set on the State level instead of at the federal level.

This would constitute an unlawful end run around the National Environmental Policy Act (NEPA) and the Act's statutory burden on EPA to consider less environmentally risky alternatives to bioreactors.

[44] 40 CFR §258.28.

II
The Proposed Rule Is Wrong As a Matter of Policy

The EPA states that the purpose of the proposed rule is "to stimulate the development of new technologies and alternative operational processes for the landfilling of municipal solid waste."[45]

The claim that the proposed rule is intended to foster innovation, rather than its obvious effect of achieving deregulation *sub rosa,* fails as a matter of law. But, it also rings hollow as a matter of policy.

True experimentation intended to provide data that may be used to revise the present national landfill criteria cannot be done without a consistently applied set of questions to be answered and uniform protocols for answering them, including controls, statistical sampling and reliable field measurements, as laid out in the scientific method.[46] Appended as ATTACHMENT B is the Affidavit of Rodney E. Stevenson in further support of these statements.

The existing rule that permits EPA consideration of innovative alternatives, which purport to provide equivalent or better environmental protection, could well be the vehicle for valid scientific investigation of those alternatives.[47] The EPA also has a plethora of in-house programs it states are intended to encourage innovation, such as the XL project and CRADA described earlier, which at least maintain a veneer of EPA oversight, coordination and control.[48]

But, dispersing the locus of investigation among 49 different States and territories would only dissipate any ability to collect comparable valid scientific data upon which rational decisions might be made. Indeed, if there is a *bona fide* interest in spurring innovative research that can be used to improve the development of a new set of landfill criteria, the proposed rule

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45 67 FEDERAL REGISTER 39663 (June 10, 2002).

46 The principles and empirical processes of discovery and demonstration considered characteristic of or necessary for scientific investigation, generally involving the observation of phenomena, the formulation of a hypothesis concerning the phenomena, experimentation to demonstrate the truth or falseness of the hypothesis, and a conclusion that validates or modifies the hypothesis. *The American Heritage Dictionary of the English Language*, 4th Ed. (Houghton Mifflin Co. 2001).

47 40 CFR §40(e). While the current rules and EPA programs could provide the basis for valid scientific inquiry, for the record, we note that this has not yet been done. Instead of a transparent process open to peer review, the development of what protocols that do exist is being done between the Office of Research and Development and Waste Management behind closed doors. Issues calling for resolution raised by others are being systemically ignored by EPA, and requests to use statistical sampling and derive key data from field observation rather than arbitrary assumptions have also been rejected. Consequently, until EPA reforms the process, which the current centralized structure makes eminently possible, the results of its investigation will be illegitimate, incomplete and useless for responsible decision making. But, that problem is a function of the application of incorrect decisions made by officials in the Agency, not in the review structures themselves provided for in the current rule.

48 *See* note 14.

would be the very antithesis of how a responsible agency would proceed to process applications seeking waivers for testing of innovative approaches.

It is true that the existing code section, permitting EPA consideration of alternative criteria, will continue if the proposed rule, delegating that power to the States, is promulgated. But that does nothing to lessen the corrosive impact of the proposed rule on scientific inquiry. For, just like the effect of Gresham's Law, in which weak currency forces strong currency out of circulation, the laxest jurisdiction for consideration of waivers will force rigorous ones out of use, as well.

The best way to explain the magnitude of the disjuncture between the goal and the rule EPA proposes to achieve that goal is to use a specific example. An excellent illustrative example would bioreactors that have been identified by EPA as one of the primary innovations it seeks to encourage with its proposed rule.[49] By way of background, according to the EPA, the difference between a dry tomb landfill, for which the current national criteria were developed, and a bioreactor is as follows –

> "Conventional landfills are typically operated as 'dry tombs' by minimizing the infiltration of liquids into the landfill. ... A typical moisture content of the waste in a conventional landfill is approximately 20 percent, but it may be lower in arid areas or where all collected leachate is removed and infiltration is minimized.
>
> "A bioreactor is defined as an MSW landfill or portion of an MSW landfill where any liquid other than leachate is added in a controlled fashion into the waste mass (often in combination with recirculating leachate) to reach a minimum average moisture content of at least 40 percent by weight to accelerate or enhance the anaerobic (without oxygen) biodegradation of the waste. The minimum 40 percent moisture level is based on literature that suggests the moisture content of the waste should remain in the range of 40 to 70 percent to optimize bioreactor operation. ..."[50]

It is this massive addition of liquids elevating moisture levels from 20% to 70% that creates enormous engineering challenges to protect health and the environment. For, unstated in the Agency's explanation is the fact that, as well as increasing the sheer weight of the waste load by more than a third, a 70% moisture content also liquefies the waste, with its complement of hazardous constituents that are a part of our trash.

Moreover, the landfills that this toxic slurry is discarded into are rarely holes dug in the ground, but rather are manmade mountains as much as 300 or sometimes 400 feet high in the air, contained by fragile sidewalls that are little more than a 2 foot berm and plastic tarp. As one might expect from envisioning this unstable mass of tens of millions of tons of liquefied garbage behind such a frail barrier, there have already been several catastrophic landslides at sites

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[49] 67 FEDERAL REGISTER 39665 (June 10, 2002).

[50] 67 FEDERAL REGISTER 36462 (May 23, 2002).

attempting to recirculate liquids.[51] We mention this to emphasize that is just one among several other very substantial downside risks that bioreactor designs create, and, hence, there is a need for the most rigorous engineering analysis to properly confirm that such a scheme can be safely employed before it is approved.

EPA states that the potential benefits to the landfill owner include the claim that "a bioreactor shortens the period of waste degradation and stabilization," with reference to the post-closure period that the landfill owner is required to maintain and monitor the site and take any needed corrective action.[52] As amplified by Waste Management, Inc. (WMI) –

> "Stabilization of the leachate and reduction in gas generation levels shortly after landfill closure can significantly reduce post-closure care costs and could ultimately result in a reduction in required final cap details and a shorter post-closure period."[53]

That is to say, Waste Management and others are hoping to convince EPA with the industry's bioreactor tests that the costly post-closure period can be shortened under any new landfill criteria added to the Subtitle D regs that authorizes this new approach.[54]

To answer this question with valid technical data requires measuring how much of the site has, in fact, been stabilized at the point in time when it is closed. Although it is certainly true that controlled liquid additions will accelerate decomposition, that is not the same thing as saying that all or even a major part of the waste load will be stabilized at closure. For major parts of the waste load will have to be off bounds for liquid additions and other parts of the mass will not be equally saturated. Among the reasons for limitations on complete or even substantial stabilization are the following –

- SIDEWALL SEEPAGE. If liquids are recirculated too close to the sides of the landfill, there will be sidewall seepage that can ultimately lead to catastrophic site failure, as has repeatedly happened already. Experts such as Edward McBean state that to prevent this, a 15 foot buffer across the internal sidewalls, and 30 feet for the

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[51] See, e.g., V. L. Wilson, et. al., "Avoiding the Slippery Slope," *Waste Age* (Feb 2001), at p. 43; Letter from Montgomery Watson to WI DNR, dated Sept. 22, 2000, re Metro Landfill in Franklin, WI; Timony D. Stark, "Leachate Recirculation and Slope Stability," Presentation at Designing and Operating Bioreactor Landfills (University of Wisconsin Department of Engineering Professional Development)(June 4-5, 2002).

[52] 67 FEDERAL REGISTER 36463 (June 10, 2002); 40 CFR §258.61.

[53] Waste Management, *The Bioreactor Landfill: The Next Generation of Landfill Management* (A White Paper from Waste Management, Inc.) (undated), at p. 2.

[54] Industry estimates that bioreactors can reduce the costs of post-closure care by shortening the period from $18.7 million for a 50 acre landfill to approximately $10.9 million. Prentis Shaw, "Bioreactor Landfills: But Does It Save Money?", Waste Age (July 2000), 18, 20.

exterior walls should be maintained.[55] For a typical cell that is 100' x 100' x 200', a buffer of that size would mean that liquids would not be added to 62% of the volume of the waste in the cell.[56] That is to say, if the bioreactor is to be operated to minimize the risk of catastrophic side wall failure, most of the waste would not be subjected to accelerated decomposition from liquid additions.

Ï PLASTIC BAGS. Most of the waste incoming load arrives in plastic bags, and, even though most of the bags will be burst open by the compactors, they will still remain splayed flat creating horizontal barriers to vertical flows of moisture.

Ð LOWER TEMPERATURE. The continuing recirculation of liquids will lower the temperature below ideal conditions for methanogenesis, especially outside the core.

Ñ HETEROGENEOUS. The waste load is heterogeneous, leading to preferred paths of liquid flows that will leave parts of the internal load without moisture.

Ò DENSITY. Especially at its lower depths of landfills deeper than 150 feet, the compacted density of the waste load increases the incoming densities of about 500 lbs./yd.^{3} to more than 2,500 lb./yd.^{3}, at which point the waste mass can become impervious to liquid flows and perched zones of saturation above that lower layer will halt the decomposition process.

These factors strongly suggest that only a minor part of the waste load will in fact be thoroughly decomposed. Consequently, if regulatory relief is sought based upon far more optimistic assumptions, careful measurements must be made to determine the actual fraction of the waste load which is, in fact, stabilized at closure to determine whether the undecomposed portion is so minor that gas generation and leachate production will be too small for longer term post-closure care to be necessary.

A review of one of the EPA's XL projects, this one involving two Waste Management landfills in Virginia, shows the kinds of measurements that are needed. These include taking bore samples of moisture content, biochemical methane potential, cellulose, lignin, hemi-cellulose, volatile solids and pH.[57] Similar efforts aimed in the direction of establishing

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[55] Edward A. McBean, "Leachate Mounding, Collection Systems, and Monitoring," *Conference on Designing and Operating Bioreactor Landfills* (University of Wisconsin Department of Engineering Professional Development)(June 4-5, 2002).

[56] Without the buffer, the volume would be 100' x 100' x 200' or 2,000,000 ft.^{3} (or 74,074 yd.^{3}). With the buffer, the volume would be 70' x 55' x 200' or 770,000 ft.^{3} (or 28,519 yd.^{3}), or only 39% of the air space without a buffer.

[57] *Final Project Agreement for Implementing Waste Treatment Systems at Two Virginia Landfills*, at Table 6A. While the proposed measurements are good, unfortunately, EPA has not yet required that

(continued...)

scientific protocols have been developed under CRADA for WMI's Outer Loup Landfill.[58]

Indeed, EPA has also developed extensive protocols to evaluate the remaining carbon potential in a waste load after undergoing accelerated decomposition that form the core of the analytical techniques required.[59] The Agency has also posted on its website, a number of questions that it believes need to be answered,[60] and which it will lose influence to have answered if the proposed rule is enacted, delegating test permits to the States.

Under the proposed rule, however, presumably there would be dozens of so-called RD&D bioreactor permits issued by a number of States, and, because the permitting process would be diffused throughout the country, and much of the testing would move under Gresham's Law to the places where the least is required, the lowest common denominator of data would tend to predominate.

We know from what has already been produced what this means. The data that will be collected to support shortening the post-closure period will record the extent to which the waste subsided in a bioreactor over a period of time compared to a dry tomb landfill.[61] However, subsidence only provides a partial indices of how much decomposition. For one thing, a significant part of the subsidence that is observed is from the sheer weight of the overlying mass, not decomposition.[62] But, apart from the confounding influence of compaction, subsidence says nothing about the key question of how much decomposition remains. Nor can comparison of the bioreactor to the dry tomb landfill reach any conclusions on that front, because neither do we do know how much decomposition remains in the dry tomb facility being used as the comparison baseline.

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57 (...continued)
statistical sampling techniques be used for selection of the bore samples.

58 Waste Management, *Quality Assurance Project Plan for Landfill Bioreactor Studies at Outer Loop Landfill Louisville, Kentucky* (September 21, 2001), at Table 3-2.

59 Marvin Barlaz, *Biodegradative Analysis of Municipal Solid Waste in Laboratory-Scale Landfills* (EPA-600/R-97-071, 1997).

60 EPA Questions About Bioreactors Listed on Their Website
"Which bioreactor operational techniques most efficiently degrade waste?
"How can operators distribute leachate and collect gas efficiently in a bioreactor setting?
"How can an interim cover be applied to a waste mass that is settling?
"How do operators ensure physical stability?
"How much moisture addition is optimal for degradation?
"What limitations exist for natural degradation ?
"When can the landfill be "switched off" and close?
"How can operators learn to control their bioreactor?

61 Pat Sullivan, "Just What Is a Bioreactor Landfill," *MSW Management* (July/August 2000), at 64.

62 Richard Sprague, "Is Piling It Higher and Deeper the Only Answer," *MSW Management* (September/October 2001), at p. 50, 51.

Thus, under the proposed rule, EPA will arrive at the point of developing rules for bioreactors without any useful and valid scientific information upon which to base an appropriate post-closure care period. The EPA has previously been severely criticized by its Inspector General for having insufficient data for setting the post-closure period in dry tomb landfills –

> "EPA officials acknowledge the lack of criteria or scientific basis for establishing the 30-year post-closure time frame. Initially, the proposed post-closure care time frame for Subtitle C hazardous waste disposal facilities had been set for a period of 20 years. Comments expressed in a 1980 Federal Register Notice asked EPA to extend the time frame of 20 years of post-closure for Subtitle C facilities to as long as the wastes remain hazardous, possibly in perpetuity. However, some who commented were concerned that an extended time frame would place an economic burden on smaller businesses. Therefore, EPA made the decision to establish the time frame at 30 years, seemingly based on a compromise of these competing interests. EPA officials we spoke to agreed that the 30-year time frame was not based on specific scientific criteria or research studies.[63]

Hopefully, the Agency will not be in precisely the same untenable technical position when it comes to establishing an appropriate post-closure care period for bioreactors as it was for dry tomb landfills. Yet, that is precisely the circumstance that promulgation of the proposed rule will create.

The proposed rule is junk science at its worst and should also be rejected as a matter of policy.

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[63] Office of the Inspector General, *RCRA Financial Assurance for Closure and Post-Closure* (2001-P-007) (March 30, 2001), at 31, 34.

CONCLUSION

The ostensible procedure to encourage tests has nothing to do with testing and everything to do with permitting States to do whatever they want and for circumventing the existing ban on bioreactors. Under RCRA, that is unlawful delegation.

It is also unlawful under NEPA to proceed without an environmental impact statement that, for the first time, would force the EPA to acknowledge logic and its own waste hierarchy by seriously investigating instead of studiously ignoring the expanded compost alternative. In the compost alternative, the major source of the problem in dry tomb landfills, the decomposable paper, food, grass, leaves and wood, would be source separated for composting, in a similar manner to current programs that source separate bottles, cans and newspapers for recycling. In this way, the problem material, which cannot safely be managed in the ground, can be kept out of the landfill in the first instance.

Moreover, apart from the legal issues, dispersing putative research permitting to the States is a terrible policy because it would make it impossible to generate consistent and usable test results that could properly serve as the technical basis for revised regulations.

The entire effort in the proposed rule ought to be aborted, and the goals that the EPA claims it intends to achieve ought to be left for the existing rule.

The proposed rule should be rejected both as a matter of law and of policy.

ATTACHMENT A

Letter from National Recycling Coalition to Environmental Protection Agency

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October 4, 2000

RCRA Docket Information Center
Office of Solid Waste (5305W)
U.S. Environmental Protection Agency Headquarters (EPA HQ)
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Re: Docket No. F-2000-ALPA-FFFFF

To Whom It May Concern:

By Notice dated April 6, 2000 (65 Fed. Reg. 18014), the U. S. Environmental Protection Agency ("EPA") requested comments and information concerning the design and performance of so-called "bioreactor landfills." We are writing in response to this request on behalf of our client, the National Recycling Coalition, Inc. (the "Coalition").

The Coalition is a not-for-profit organization founded in 1978 and dedicated to the advancement and improvement of recycling, source reduction, composting and reuse by providing technical information, education, training, outreach and advocacy services to its members in order to conserve resources and benefit the environment. Its 5,000 members include recycling professionals from the public and private sectors, large and small businesses, and local, state and federal government agencies. Twenty-six state recycling organizations are affiliated with the Coalition. The Coalition thus has a strong and continuing interest in solid waste disposal practices that are responsible, sustainable and ecologically sound, both to protect the environment and to assure a level playing field for recycling and other alternatives to landfills.[64]

Because "bioreactor landfills" may be neither sustainable nor ecologically sound, and because EPA appears thus far to have failed to consider adequately bioreactors or any alternatives to them, we urge that EPA proceed with caution. In particular, we call upon EPA to analyze thoroughly – consistently with its obligations under the National Environmental Policy Act, 42 U.S.C. §§4321 *et seq*. ("NEPA") – all appropriate alternatives to the "bioreactor landfills" proposal.

[64] The Coalition has previously commented to EPA on problems associated with landfills and their regulation. See, in particular, the Coalition's February 24, 2000 letter in Docket F-1999-NLFN- FFFFF, noting EPA's view that "any [landfill] liner will begin to leak eventually," and suggesting that "inadequate regulation of landfills to protect public health and the environment over the long-term results in understating the cost of disposal which places recycling at an economic disadvantage."

INTRODUCTION

EPA's April 6 Notice stated that

> In recent years, bioreactor landfills have gained recognition as a possible innovation in solid waste management. The bioreactor landfill is generally defined as a landfill operated to transform and more quickly stabilize the readily and moderately decomposable organic constituents of the waste stream by purposeful control to enhance microbiological processes. Bioreactor landfills often employ liquid addition including leachate recirculation, alternative cover designs, and state-of-the-art landfill gas collection systems.

However, before addressing how to permit bioreactors, EPA should first set the stage by defining the underlying problems that have led to this investigation. Once that is done, EPA should consider the full range of alternative options that might resolve those problems with the least adverse environmental consequences. The proper vehicle for such an analysis is, of course, an environmental impact statement. Given that alternatives to bioreactors such as composting may well be far preferable, EPA cannot proceed to develop bioreactor rules until such an analysis is carried out.

EPA is to be commended for its efforts a decade ago that developed what was, at the time, a major advance in waste management practices. Through its rule-making process based upon the 1984 Resource Conservation and Recovery Act ("RCRA") amendments, EPA's Subtitle D regulations closed down the nearly 5,000 unengineered open dumps across the county that posed a threat to the environment. But now, sixteen years later, we have nearly a decade of experience under the industry's belt operating the first generation of the new engineered landfills. In those intervening years, we have all learned much that can be used to achieve the long term goal of protecting the environment from the risks posed whenever solid wastes with hazardous and toxic components are discarded in the ground. Bioreactors are just one among many options to address these concerns, and in investigating them, EPA should revisit and reconsider its early landfill assumptions.

BACKGROUND FACTS

Among the lessons learned from the past decade is that current designs for MSW landfilling are predicated upon two significant fallacies: that MSW is less threatening than hazardous waste and that landfill containment systems will function for the length of time the waste load remains a threat to the environment.

The RCRA amendments decreed that the new generation of engineered landfills under Subtitle D would handle "sanitary" waste.[65] The rules enacted under the statute then relied upon a single composite liner and cover as barriers. These were combined with leachate collection, gas extraction and monitoring systems, in an attempt to isolate from the environment the leachable constituents in the municipal waste load for the period of time that they posed a threat. As finally adopted, the regulations set a post-closure period of 30 years (with undefined extensions) as the length of time the waste needed to be isolated.[66] Preliminary efforts to recognize a longer term problem were deleted from the final rules, with perhaps, in hindsight,

[65] RCRA §4004(a), 42 U.S.C. §6944(a).
[66] 40 CFR Part 258.

imprudent recourse to the provision in Subtitle D permitting the Agency to "take into consideration the practicable capabilities of such facilities."[67]

In any event, however, the constituents of what is legally defined to be "sanitary" waste have been documented to be, in fact, essentially indistinguishable from hazardous waste streams.[68] As to what is required to isolate hazardous waste, in its Subtitle C regulations, EPA concluded that *two* sets of composite liners and leachate collection systems, among other extra measures, are necessary to protect the environment.[69] Also, it has become increasingly apparent in recent years that the time for a MSW landfill to reach the point at which the load becomes benign extends hundreds of years, depending upon site-specific local conditions -- not 30 years.[70]

EPA has repeatedly acknowledged that the containment systems prescribed in the landfill rules will over time degrade and ultimately fail, most recently in its proposed rule-making for the current composite liner landfills currently in use, which led up to the promulgation of the rules in 1991:

> "…[E]ven the best liner and leachate collection systems will ultimately fail due to natural deterioration, and recent improvements in MSWLF containment technologies will be delayed by many decades at some landfills."[71]

This is the nub of the conundrum. Because of those same, limited-life containment systems, the inevitable future containment failures will most likely occur after the legal liabilities, monitoring systems and responsible institutional structures established by the regulations no longer exist. It is a sad thing to say, but the current landfill rules appear to do more to protect the bond sureties than the environment. We have simply shifted the problem from our children to our grandchildren, and left a major clean up task for future generations that, financially, will likely be of the magnitude of the Savings and Loan debacle in the 1980's, or current Superfund clean up efforts.

BIOREACTOR PROBLEMS

Bioreactors represent, in effect, a proposal to substitute attempts to accelerate decomposition through in-site recirculation for the present entombment strategy. Proponents of bioreactor systems rarely explicitly concede the inherent inadequacies with the current standards that militate against entombment. But they do emphasize the hope, similar to that stated in EPA's current Federal Register Notice, that recirculation will "transform and more quickly stabilize the readily and moderately decompostable organic constituents of the waste stream" and thereby reduce the leachate and gas formation that will occur after closure.

Proponents add that the cost of the basic piping and pumps for recirculating leachate and accelerated gas extraction will be offset by recirculating instead of treating leachate and by recovering 50% of the airspace through higher final densities so that "bioreactors landfills save money in the long-term."[72]

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[67] 56 FED. REG. 50978, 50983 (October 9, 1991).
[68] 56 FED. REG. 50982-50984 (October 9, 1991).
[69] 40 CFR Part 257.
[70] Commission of the European Community, *Management and Composition of Leachate from Landfills: Final Report* (1994), at 7, Table 1.2.
[71] 53 FED. REG. 33345 (August 30, 1988).
[72] Prentis Shaw, "Bioreactor Landfills: But Does It Save Money," *Waste Age* (July 2000), at 16.

However, at the same time, a number of major and potentially crippling problems with bioreactors have been identified:

(1) Because much municipal waste is encased in plastic bags, only some of which may be breached when the loads are compacted, a significant fraction of the waste load will remain isolated from the recirculating liquids and not be decomposed prior to landfill closure, absent pre-shredding.

(2) Installing effective gas extraction systems contemporaneous with the onset of recirculation in order to capture the accelerated formation of greenhouse and VOC gases – all at the same time that rapid settlement due to that recirculation is ongoing – would seem to be exceedingly difficult to accomplish. Indeed, present operational practices assume that gas is vented for the first two years of a landfill cell's life, which is only palatable in that case because gas generation ramps up slowly in a dry landfill.

(3) Maintaining even wetting by the recirculation system to avoid differential settlement that could destablize the site may be difficult.

(4) Avoiding excessive wetting near sidewalls, where breakouts might occur following saturation of the waste load, may also prove difficult without well-controlled recirculation.

(5) Providing a liner/leachate collection system that will work properly with the far greater hydraulic loadings involved in bioreactors is not likely to be achieved with the current designs for non-hazardous municipal solid waste landfills, absent (at a minimum) two composite liners and leachate collection systems.

According to experts in the field consulted by the Coalition's representatives, none of the current research being undertaken today is properly designed to address and resolve these outstanding issues.

To the extent that EPA's analysis in this proceeding confirms these potential problems, as the Coalition believes likely, technical fixes to resolve them may be developed. However, the costs of doing so through such things as pre-shredding and double composite liners would probably dramatically increase disposal costs in bioreactors as compared to entombment landfills. This would suggest that political pressure would arise to take environmental shortcuts in any final regulations that are ultimately promulgated,[73] with the result that the underlying problems would remain unresolved.

In any event, and in addition to what this implies for expanding the options that are considered (see below), the rationale for this proceeding needs to be clarified. If recirculation needs to be pursued to reduce the risks posed by entombment, that fact needs to be expressly stated. Only then can we know whether the new sets of risks which bioreactors present are outweighed by the clear and present threat posed by the thousands of operating and closed landfills that were licensed earlier under Subtitle D for dry tomb conditions. Were dry landfills

[73] *See, e.g.*, 56 FED. REG. 50978, 50983 (October 9, 1991).

perfectly safe, as their proponents assert, there would not seem to be any reason to incur the unknowns and risks posed by untested bioreactors.

ALTERNATIVES

There are alternative means to resolve the problem with land disposal arising from the fact that discarding compostable material into the ground threatens the environment. A primary one to consider is the separation of compostables at the source in the home or commercial establishment, and separate collection of these organic material streams. A variety of collection and processing systems exist to accomplish this goal.

Already common throughout the U.S. today are systems that collect yard trimmings (including grass clippings, leaves, and prunings) separately, for processing often in windrow composting facilities. Increasingly, many communities are studying or implementing new programs to collect residential and/or commercial/institutional food discards, and food-contaminated paper. The latter programs have been demonstrated extensively in Europe, particularly the Netherlands, and are often combined with collections of yard trimmings for maximum collection efficiencies.[74]

Finally, some areas have begun to experiment with wet/dry systems for composting. While wet/dry systems are not yet commonplace, there are a number of first generation programs, including full-scale operations in Guelph, Ontario,[75] and pilot programs in San Francisco, California.[76] These are sufficient to develop meaningful data that can be compared in an environmental impact statement against the demonstration bioreactor trials, and also to show, in response to RCRA §4004(a), that they are a practical alternative.

In all of these organic recycling systems (and undoubtedly in others as well), the compostable fraction that is the source of the leachate and gas generation in landfills never becomes mixed with the hazardous constituents in municipal solid waste and discarded in the ground to threaten the environment. Instead, it is composted into a soil amendment to help restore agricultural productivity and in other horticultural applications.

It should also be noted that a movement away from acceptance of compostable material at landfills is already the policy of the European Community, which last year "set up a national strategy for the implementation of the reduction of biodegradable waste going to landfills."[77]

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[74] Ann Scheinberg, "Going Dutch: Collecting Residential Organics in the Netherlands," *Resource Recycling* (January 1996), at 33-40.

[75] Judy Roumpf, "Wet and Dry All Over," *Resource Recycling* (April 1998), at 28; Cathy Smith, et al., "Wet-Dry Recycling: Evaluating Two-Stream Processing," *Resource Recycling* (September 2000), at 26.

[76] San Francisco Department of Public Works, *Curbside Recycling, the Next Generation: A Model for Local Government Recycling and Waste Reduction* (2000).

[77] See European Community, Council Directive 1993/31EC (April 26, 1999), at Article 5, paras. 1 and 2:

"Waste and treatment not acceptable in landfills.

"1. Member States shall set up a national strategy for the implementation of the reduction of biodegradable waste going to landfills, not later than two years after the date laid down in Article 18(1) and notify the Commission of this strategy. This strategy should include measures to achieve the targets set out in paragraph 2 by means of in particular, recycling, composting, biogas production or materials/energy recovery. Within 30 months of the date laid down in Article 18(1) the Commission shall provide the European Parliament and the Council with a report drawing together the national strategies.

"2. This strategy shall ensure that:

"(a) not later than five years after the date laid down in Article 18(1), biodegradable municipal waste going to landfills must be reduced to 75% of the total amount (by weight) of biodegradable municipal waste produced in

(continued...)

Thus it should be clear that the issues that we are raising for an alternatives analysis are firmly grounded in professional solid waste practice today and not in any way outside the bounds of a realistic or practical alternative.

EPA'S OBLIGATIONS TO CONSIDER ALTERNATIVES

Notably absent from EPA's April 6 Notice in this matter is any recognition of EPA's duties under NEPA to "identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment," and to "integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts."[78] Indeed, the only alternatives with which EPA appears to be concerned in its Notice are alternative landfill liner designs. While EPA requests information on such minutia as "relevant patent issues associated with anaerobic, aerobic, or other bioreactor landfills," it nowhere asks commenters to provide information on alternatives to the bioreactors themselves. Perhaps EPA intends to consider alternatives to this proposal at some later date, but such delay is clearly inconsistent with NEPA's mandate to weigh alternatives "at the earliest possible time."

Although EPA's actions under certain statutes are exempted from NEPA,[79] there is no exemption from NEPA for an EPA rulemaking under RCRA. It would only be possible to ignore NEPA here if EPA's action in adopting rules for bioreactors could be considered to be <u>not</u> a "major Federal action[] significantly affecting the human environment."[80] But given the impact such rules would have on thousands of major landfills across the country, and the "irreversible and irretrievable commitments of resources"[81] which would be involved in a national policy favoring bioreactors, a conclusion that such rules are anything other than "major Federal action" triggering NEPA seems inconceivable. Once NEPA coverage is conceded, it appears clear to us that the rulemaking process for bioreactors cannot continue without development through the

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(...continued)

1995 or the latest year before 1995 for which standardised Eurostat data is available;

"(b) not later than eight years after the date laid down in Article 18(1), biodegradable municipal waste going to landfills must be reduced to 50% of the total amount (by weight) of biodegradable municipal waste produced in 1995 or the latest year before 1995 for which standardised Eurostat data is available;

"(c) not later than 15 years after the date laid down in Article 18(1), biodegradable municipal waste going to landfills must be reduced to 35% of the total amount (by weight) of biodegradable municipal waste produced in 1995 or the latest year before 1995 for which standardised Eurostat data is available.

"Two years before the date referred to in paragraph (c) the Council shall reexamine the above target, on the basis of a report from the Commission on the practical experience gained by Member States in the pursuance of the targets laid down in paragraphs (a) and (b) accompanied, if appropriate, by a proposal with a view to confirming or amending this target in order to ensure a high level of environmental protection. Member States which in 1995 or the latest year before 1995 for which standardised Eurostat data is available put more than 80% of their collected municipal waste to landfill may postpone the attainment of the targets set out in paragraphs (a), (b), or (c) by a period not exceeding four years. Member States intending to make use of this provision shall inform in advance the Commission of their decision. The Commission shall inform other Member States and the European Parliament of these decisions. The implementation of the provisions set out in the preceding subparagraph may in no circumstances lead to the attainment of the target set out in paragraph (c) at a date later than four years after the date set out in paragraph (c)."

[78] 40 CFR §§1500.2(e), 1501.2.

[79] *See, e.g.*, 15 U.S.C. §793(c)(1) (Clean Air Act).

[80] NEPA §102, 42 U.S.C. §4332.

[81] *Id*.

environmental impact process of the costs and benefits of both bioreactors and their alternatives, such as composting.

The Coalition looks forward to participating further in this matter as EPA's analysis proceeds. Please feel free to contact me at (212) 238-8798 should you have any questions or require any additional information on the issues we have raised above on behalf of the Coalition with respect to EPA's bioreactor landfill proposal.

Sincerely,

CPC:kr

Clifford P. Case, III

Attachment B
Affidavit of Rodney E. Stevenson

STATE OF WISCONSIN)
) ss
DANE COUNTY)

AFFIDAVIT OF RODNEY E. STEVENSON

RODNEY E. STEVENSON, being first duly sworn, on oath, deposes and states as follows:

1. My name is Rodney E. Stevenson. My address is Graduate School of Business, University of Wisconsin, Madison, 975 University Avenue, Madison, WI, 53706. I am a Professor Business and Environmental Studies. My vitae is attached and incorporated into this affidavit.

2. I have reviewed the Environmental Protection Agency's (EPA) proposed rule, 40 CFR 258.4, that would authorize approved States and territories to issue research, demonstration and development (RD&D) permits in order to encourage innovative landfill practices. My purpose was to determine whether the procedures laid out in the rule can be expected to produce reliable data from which technical decisions can properly be made. I have also compared the proposed rule to an existing rule, 40 CFR 258.40(e), that provides an alternative vehicle for consideration of innovations.

3. Shifting from the existing EPA rule to the proposed rule will not generate information sufficient to serve as a reliable basis for future revisions to the minimum national landfill criteria.

4. The EPA rules are deficient in specifying appropriate oversight and evaluation mechanisms to assure that any innovative departures from current EPA landfill design and operating criteria will meet or exceed groundwater leachate contamination drinking water standards.

5. Dissipating oversight authority among the 49 states and territories renders necessary test and protocol coordination impossible. Without adequate oversight and coordination, data from participating states will not be sufficiently detailed and comparable so as to allow appropriate evaluation. At best, state provided data are likely to be anecdotal.

6. The current EPA rules that provide for a central oversight and coordinating body are sufficient for establishing processes to acquire and evaluate data appropriate for any appropriate code updates.

_____
RODNEY E. STEVENSON

Dated:_____

Subscribed and sworn to before me
This _ day of August, 2002.

My commission_____.

RODNEY STEVENSON
CURRICULUM VITA

EDUCATION

1968 BA Economics , Monmouth College, Illinois

1973 Ph.D. Economics, Michigan State University
Major fields and concentrations
Regulatory Economics and Industrial Organization
Economic Theory
Economic Development
Econometrics and Statistics

ACADEMIC APPOINTMENTS

Professor, University of Wisconsin-Madison

School of Business

from 90 Professor
1981-90 Associate Professor
1976-81 Assistant Profesor

Institute for Environmental Studies

from 90 Professor
1992-97 Chair, Energy Analysis and Policy Program
1981-90 Associate Professor
1980-81 Assistant Professor

Wisconsin Public Utility Institute

from 98 Senior Faculty Advisor
1994-98 Co-Director
1987-94 Executive Director
1982-87 Director
1982 Founder

Other Academic Appointments

1988-89 Visiting Scholar
Institute of Social and Economic Research
Osaka University, Osaka, Japan.

1975-76 Adjunct Assistant Professor
Department of Economics
Michigan State University

1972-76 Instructor, University College
University of Maryland

1968 Teaching Assistant
Department of Economics
Michigan State University

Other Positions

1981 - 84	President Arbeit, Inc.
1980 - 86	President Public Service Associates, Inc.
1973-75	Economist Office of Economics United States Federal Power Commission
1971	Economist Office of the Chief Economist Univet States Postal Rate Commission

RESEARCH AND PUBLICATIONS

Books, Monographs, and Technical Reports

1999 *Low-Income Energy Service Policy Assessment*
Technical Report to the Energy Center of Wisconsin

1998 *Telecommunications Cost Allocation and Pricing:*
Technical Report to the Pennsylvania Public Service Commission

1997 *Low Income Policy Response Simulation Model and Technical Documentation*
with J. Huddleston and D. Ray,Technical Report to the Energy Center of Wisconsin

1996 *Energy Services in Low-Income Households*
with J. Huddleston and D. Ray, Technical Report to the Energy Center of Wisconsin

1996 *Biomass Energy Infrastructure Development*,
Co-Editor with A. Olson, Wisconsin Public Utility Institute

1995 *Subsidies and Unfair Competitive Advantages: A Review*
with G Mendl, et al., Technical Report to the American Public Power Association

1995 *Land Economics Special Issue on Public Utility Regulation*
Co-Editor with H. Trebing and E. Miller, University of Wisconsin Press

1994 *Policy Options for Competition in Wisconsin's Electric Power Industry*
with L. Cullen, G. Mathis, and D. Ray, Wisconsin Public Utility Institute Report

1994 *International Perspectives on Telecommunications Policies*
Senior Editor, JAI Press

1993 *The Value of Transmission Security*
with F. Alvarado, D. Ray, and L.Kirsch, Electric Power Research Institute

1992 *Electric Utility Mergers and Regulatory Policy*
with D. Ray, R. Shiffman, and H.Thompson, National Regulatory Research Institute

1982 *Utility Flexible Pricing Study: Wisconsin*
with M. Caramanis and R. Tabors,
Technical Report to the Public Service Commission of Wisconsin

1981 *Waste Heat Recovery Potentials for Wisconsin Paper and Food Processing Industries*
with W. Foell, D. Ray, et al., Technical Report to the U.S. Department of Energy

1981 *Productivity Measurement in Regulated Industries*
Co-Editor with T. Cowing, Academic Press

1980 *The Possibility Lifeline of Rates for Gas and Electric Utility Service in New Mexico*
with L.Adcock, et al., Technical Report to the New Mexico Public Service Commission and the New Mexico Legislature

1980 *Industrial Energy Use in Wisconsin: Consumption Patterns and Conservation Measures*
with W.Foell, et.al, University of Wisconsin, Madison

1979 *Direct Load Management*
with R. Timm. Technical Report to the Wisconsin State Energy Office and Wisconsin Environmental Decade

1978 *Methods to Improve Gas Utility Transmission and Distribution Efficiency*
with R. Brandi, et al., Technical Report to the U.S. Department of Energy

1974 *Productivity and Public Utility Regulation*
National Association of Regulatory Utility Commissioners

1973 *Postal Pricing Problems and Production Functions*
Ph.D. Thesis, Michigan State University

Articles

2002 "An Ethical Basis for Institutional Economics," *Journal of Economic Issues,* forthcoming

"Energy Price, Environmental Policy, And Technological Bias, *Journal of Energy Economics*, forthcoming.

2001 "Exploring the Ethics and Economics of Global Labor Standards: A Challenge to Integrated Social Contract Theory" with L. Hartman and B. Shaw, *Business Ethics Quarterly*, forthcoming

2000 "Human Resources Opportunities to Balance Ethics and Economics in Global Labor Standards" with L. Hartman and B. Shaw, *Business & Professional Ethics Journal*, vol 19, nos. 3 & 4

1998 "Oil Prices, Bias of Technology and Mandatory Abatement Costs: Dynamic Response in U.S. Industrial Energy Demand"
with A. Taheri, *Australian Econometric Society Proceedings*

1997 "International Energy Markets, Competition and Policy"
with A. Taheri, *International Association of Energy Economists Proceedings*

1995 "Discretionary Evolution - Restructuring The Electric Utility Industry"
with D. Penn, *Land Economics*, August

1995 "Transformation of the Electric Utility Industry"
with D. Ray, *Networks, Infrastructure, and the New Tasks for Regulation*, W. Sitchel and D. Alexander, Co-Editors, University of Michigan Press

1995 "Wisconsin's Public Policy Options for Competition"
with D. Ray and L. Cullen, *Reinventing Electric Utility Regulation,* G. Enholm and J. R. Malko, Co-Editors, Public Utility Reports, Inc.

1994 "The Productivity Effects of Japanese Telecommunication Policy"
with T. Oum, H. Oniki, and Y.Zang, *Journal of Productivity Analysis*, Vol. 5, 63-79

1994 "Social Goals and the Partial Deregulation of the Electric Utility Industry"
Journal of Economic Issues, vol. 28, no. 2, June

1993 "Industrial Structure and Power"
Institutional and Evolutionary Economics, W. Samuels, G. Hodgeson, and M. Tool, Co-Editors, Edward Elgar Publishing

1993 "Market Forces and Planning by Regulation: Conflicts and Complementarities" with D.Ray, *Utilities Policy*, October

1993 "The Productivity of Nippon Telegraph and Telephone Company" with H. Oniki and T. Oum, *Japanese Telecommunications and Economics*, Nikkei Publishing Co., *in Japanese*

1993 "Competition and Privatization: Japanese Telecommunications Policy" with H. Oniki and H. Sato, *International Review of Comparative Public Policy*, vol. 5

1993 "Telecommunications Needs and Social Impacts: State Government User Needs" *Convergence, Competition, Cooperation: The Report of the Governor's Blue Ribbon Telecommunications Infrastructure Task Force,* Vol. 2 Chapter 5

1993 "Telecommunications Technology: Wisconsin's Existing Infrastructure" *Convergence, Competition, Cooperation: The Report of the Governor's Blue Ribbon Telecommunications Infrastructure Task Force,* Vol. 2 Chapter 9

1992 "Comparative Research on the Value of Transmission Security" with F.Alvarado and R.Adapa, *American Power Conference Proceedings*

1991 "Departures From Minimum Cost Performance: A Framework For Analysis Of Firm Inefficiency," with D. Reifschneider, *International Economic Review*, August

1992 "Electric Utility Least-Cost Planning" with M. Hanson, S.Kidwell, and D. Ray, *Journal of the American Planning Association*, Winter

1992 "Engineering Foundations for the Determination of Security Costs" with F. Alvarado, et al., *IEEE Transactions on Power Systems,* August

1992 "Review of *After the Break-Up: Assessing the New Post-AT&T Divestiture Era*" *Columbia Journal of World Business*, Fall

1992 "Incorporation of Environmental Externalities into Integrated Resource Planning" with J. Fagan, *Integrated Resource Planning Proceedings*, National Association of Regulatory Utility Commissioners, Washington, D.C.

1990 "Competition in the American Electric Utility Industry" with D. Penn, *Deregulation and the Public Utilities*, T. Hayashi, Editor

1989 "Equity, Social Values, and Public Utility Regulation", *Alternatives to Traditional Regulation: Options for Reform*, H.Trebing, Editor, Michigan State University Press

1989 "Review of *Public Policy Toward Corporations*" *Journal of Economic Issues*, Vol. 23, No. 1, March

1989 "Competition in the American Electric Utility Industry" *Energy and Resources -Journal of the Japan Society of Energy and Resources*, May, *in Japanese*

1989 "Japanese Telecommunication Policy: After Privatization and Liberalization" with H. Sato, *Columbia Journal of World Business*, Spring

1988 "Transmission Access and Competition in the Electric Utility Industry" with D. Penn, *The Electricity Journal*, October

1987 "*Direct Electric Utility Competition: The Natural Monopoly Myth*, A Review", *Land Economics*, Vol. 63, No. 3, August

1987 "Institutional Economics and the Theory of Production" *Journal of Economic Issues*, Vol. 21, No. 4, December

1985 "Incentive Effects of Utility Rate Trending" *Resources and Energy*, Vol. 7, No. 1

1985 "Corporate Power and the Scope of Economic Analysis" *Journal of Economic Issues*, Vol. 19, No. 2, June

1983 "A Comparison of Alternative Frontier Cost Function Specifications" with T. Cowing and D. Reifschneider, *Developments in Econometric Analyses of Production Efficiency,* A. Dogramaci, Editor, Kluwer Nijhoff Publishing, Boston

1985 "Institutional Objectives, Structural Barriers, and Deregulation in the Electric Utility Industry", *Journal of Economic Issues*, Vol. 17, No. 2, June

1982 "Allocative Efficiency and Automatic Adjustment Clauses: A Theoretical Analysis", with Thomas Cowing, *Journal of Economics and Business*, Vol. 34, No. 4

1982 "X-Inefficiency and Interfirm Rivalry: Evidence from the Electric Utility Industry" *Land Economics*, Vol. 58, No. 1, February

1981 "Productivity Measurement and Regulated Industries: An Introduction " with T. Cowing, *Productivity Measurement in Regulated Industries*, T. Cowing and R. Stevenson, Co-Editors, Academic Press

1981 "Comparative Measures of Productivity in the Regulated Sector: Examples from the Electric Utility Industry," with T. Cowing and J. Small, *Productivity Measurement in Regulated Industries*, T.Cowing and R. Stevenson, editors, Academic Press

1981 "Establishing Objectives for Residential Load Research" *U.S. Department of Energy Electric Rate Demonstration Conference Proceedings*

1981 "Problems in Electric Utility System Planning" with R.Timm, *Challenges for Public Utility Regulation in the.1980s*, H. M. Trebing, editor, Michigan State University Press

1981 "*Public Utility Economics and The Control of Natural Monopolies*: A Review" *Land Economics*, Vol. 57, No. 1, February

1980 "Measuring the Potential Impacts from Lifeline Pricing of Electricity and Natural Gas Services," with Dennis Ray*, Issues and Problems in Public Utility Regulation*, M. Crew, editor, Lexington Books

1980 "Measuring Technological Bias" *American Economic Review,* Vol. 70, No. 1, March

1980 "Likelihood Functions for Generalized Stochastic Frontier Estimation" *Journal of Econometrics*, May

1980 "Productivity Measurement and Public Utility Regulation"
with Thomas Cowing, *Public Utilities Fortnightly*, July 31

1979 "Social Responsibility and Public Utility Regulations"
Department of Energy and White House Office of Consumer Affairs Conference Proceedings

1979 "Energy Regulation and Federalist Solution"
Issues in Public Utility Regulation, H. Trebing, Editor, Michigan State University Press

1978 "Productivity Measurement in Regulated Industries: Some Conceptual Issues"
with T. Cowing, *American Institute of Decision Science Proceedings - North East*

1978 "Assessing New Price Structures and Policies: Comments"
Assessing New Pricing Concepts in Public Utilities, H. Trebing, Editor, Michigan State University Press

1978 "New Energy Sources: Economic Feasibility, Costing, and Pricing: Comments"
Assessing New Pricing Concepts in Public Utilities, H. Trebing, Editor, Michigan State University Press

1978 "Evaluating New Pricing Practices in Electricity: Comments"
Issues in Public Utility Regulation, H. Trebing, Editor, Michigan State University Press

1976 "The Pricing of Postal Services"
New Dimensions in Public Pricing, H. Trebing, Editor, Michigan State University Press

1975 "Productivity in the Private Electric Utility Industry:1951-1973"
Public Utility Productivity: Management and Measurement, W. Belk and J. Shrafitz, Co-Editors, New York State Department of Public Service, Albany, New York

1975 "Regulatory for Efficiency in the Public Utility Industry"
Public Utility Productivity: Management and Measurement, W. Belk and J. Shrafitz, Co-Editors, New York State Department of Public Service, Albany, New York

1974 "The Historical Development of Industrial Organization"
with A. Phillips, *History of Political Economy*, Vol. 6, No. 3, Fall

1972 "The Role of Quantitative Economics in the Regulatory Process"
Regulatory Information Systems Proceedings

COURSES AND PRESENTATIONS

Courses

Business Ethics and Social Responsibility
Public Utilities
Public Utility Problems - Integrated Resource Planning
Energy Economics
Business and the Environment
Risk and the Environment
Economics of Regulation
Government and Business
Public Policies Towards Industry
Managerial Economics
Energy Conversion Technologies Seminar
Energy and the Environment Seminar
Transportation and Public Utility Graduate Seminar
Energy Policy Graduate Seminar

Professional Presentations *since 1988*

2002	*Awarding Ethical Business Behavior* Association of Security Analysist Professionals
2002	*An Ethical Basis for Institutional Economics* Presidential Address, Association for Evolutionary Economics
2001	*Sweatshops: Sacrificing Labor for Economic Development* Association for Evolutionary Economics
2000	*Taxicabs Are Not Public Utilities*
	Transit and Parking Commission, City of Madison, Wisconsin
2000	*Madison's Taxicabs Should Be Deregulated*
	WIBA Radio
1999	*Modeling and Measuring Low Income Energy Policies*
	Energy Center of Wisconsin
1998	*Fermont Economics*
	Keynote Address for the Nebraska Economics Association Annual Meetings
1998	*Antitrust and the Deregulation of the Electric Utility Industry*
	Annual Conference of the National Association of Regulatory Commissioners
1998	*Three Stories and a Moral*
	Keynote Address, Wisconsin Energy Bureau Low Income Energy Pilots Conference
1998	*Mergers and Competition in the Public Utility Industry*
	American Economic Association meetings, Transportation and Public Utility Group
1997	*Two Approaches to Environmental Regulation - the PSC and the DNR*
	Conference on Environmental Consequences of Electric Utility Deregulation
1997	*The Impact on the Poor of Energy Deregulation*
	Keynote Address, Annual Conference on Energy Policies and the Poor
1997	*New Challenges for Industry – Energy Dereguation*

	Wisconsin Industrial Energy Group
1997	*Unions and Electric Utility Regulation*
	Conference of the Wisconsin Brotherhood of Electrical Workers Union
1997	*Buddhist Approaches to Pain Management*
	Wisconsin Medical Ethics Network Meetings
1997	*Energy Efficiency and Conservation, Teaching by Doing*
	Wisconsin Division of Energy Conference for Educators and School Administrators
1997	*Universal Service Policies for the Telecommunications Industry*
	Conference on Telecommunications Reforms, Wisconsin Public Utility Institute
1996	*The Restructuring Debate: Social Concerns, Mergers, and Lessons From Telecommunications and Natural Gas*
	Annual Meeting of WPPI, System, Inc.
1996	*Transition Models to a More Competitive Electric Utility Industry*
	NARUC Advanced Regulatory Studies Program
1996	*Meeting Social Objectives in a More Competitive Electric Utility Industry*
	NARUC Advanced Regulatory Studies Program
1996	*Meeting Low-Income Energy Needs in a Changing Environment*
	Wisconsin Low-Income Energy Services Conference
1996	*Electric Utility Deregulation: Prairie Fire or Brush Fire*
	Annual Conference of the Municipal Electric Utilities of Wisconsin Association
1996	*Competition and Corporate Cultures*
	Tri-State Conference of Rural Electric Cooperatives Senior Management Indiana, Michigan, Ohio
1996	*Universal Service: A State Paradigm*
	Biannual Regulatory Information Conference
	National Regulatory Research Institute, Ohio State University
1995	*Conditions for Welfare-Enhancing Competition in Wholesale and Retail Electric Power*
	American Economic Association Transportation and Public Utility Group Annual Meetings
1995	*Historical Perspectives on the Restructuring of the Electric and Natural Gas Industries*
	United States Department of Energy National Energy Outlook Conference
1995	*Options for Competition in the Electric Utility Industry*
	Annual Conference of the Michigan State University Institute of Public Utilities
1995	*Electric Utility Competition: Lessons from the Natural Gas and Telecommunication Industries*
	American Public Power Association Joint Action Agency Conference
1995	*Who Should Be Responsible for Generation Adequacy and Transmission Reliability in an Open Marketplace?*
	Power Systems Engineering Research Consortium Conference on Technological Foundations for Customer Choice in the Electric Power Industry
1995	*Perspectives on Combination and Straight Utilities*

	Mid-America Regulatory Conference
1995	*Electric Utility Restructuring and Environmental Concerns*
	Wisconsin Department of Natural Resources
1995	*Electric Utility Restructuring and the Future for Nuclear Power*
	University of Wisconsin Nuclear Engineer Students Association
1995	*Energy and Economics*
	Special Lecture For Energy Resources Class
1995	*Industrial Organization - an Introduction and Overview Public Service Commission of Wisconsin Natural Gas Study Group*
	Options For The Restructuring Of Electricity Transmission NARUC Annual Regulatory Studies Program
1995	*The Restructuring Debate: Direct Access and Public Policy Objectives*
	Center for Regulatory Studies, The Electricity Policy Pre-Summit Series
1995	*Will Regulation Light Promote the Public Interest: A Critique of Regulatory Options*
	Annual Meeting of the National Association of Regulatory Utility Commissioners
1994	*Social Goals and the Partial Deregulation of the Electric Utility Industry*
	Association for Evolutionary Economics Annual Meetings
1994	*Options for Competition in the Electric Utility Industry*
	Annual conference of the Michigan State University Institute of Public Utilities
1994	*Electric Utility Competition: Lessons from the Natural Gas and Telecommunication Industries*
	American Public Power Association Joint Action Agency Conference
1994	*Transmission Policy and Essential Facilities: Lessons Learned from the Natural Gas and Telecommunications Industries*
	Conference of the Transmission Access Policy Group
1994	*Information Session of Telecommunications Legislation*

	Special Session of the Wisconsin Legislature invited presentation
1994	*Testimony on Telecommunications Legislation*
	Joint Finance Committee, Wisconsin Legislature invited presentation
1994	*Telecommunications Reform and the Wisconsin Telecommunications Bill*
	Democratic Assembly Caucus, Wisconsin Legislature invited presentation
1994	*Reforming Telecommunications Regulation*
	Wisconsin Public Utility Institute Campus Seminar
1994	*Telecommunications Industry Structure and Regulatory Reform*
	Wisconsin Public Utility Institute Essentials of Telecommunications Regulation Program
1993	*Planning By Regulation*
	Joint Session of the American Economic Association Transportation and Public Utility Group and the Association for Evolutionary Economics Annual Meetings
1993	*Transformation of the Electric Utility Industry*
	10th Annual Michigan Conference on Regulation
1993	*Regulation and Incentive Rate Systems*
	Great Lakes Conference of Regulatory Utility Commissioners
1993	*Regulatory Reform For Telecommunications in Wisconsin*
	Society of Telecommunication Professionals
1993	*Federal Restructuring Policies and State IRP and DSM Policies: Harmony or Conflict*
	Annual Conference of the Michigan State University Institute of Public Utilities
1993	*Telecommunications Market Trends and Regulation*
	Wisconsin Public Utility Institute Essentials of Telecommunications Regulation Program
1993	*Energy Utilities Industry Structure Revenue Requirements and Rate Design*

	Wisconsin Public Utility Institute Essentials of Energy Utilities and Regulation -- and Contemporary Issues in Energy Utilities Programs
1993	*Alternatives to Rate Base Regulation*
	Wisconsin Public Utility Institute Essentials of Energy Utilities and Regulation -- and Contemporary Issues in Energy Utilities Programs
1993	*Incentive Systems and Rate Regulation*
	Wisconsin Public Utility Institute Essentials of Energy Utilities and Regulation -- and Contemporary Issues in Energy Utilities Programs
1993	*Forces for Change in the Electric Industry*
	Wisconsin Public Utility Institute Essentials of Energy Utilities and Regulation -- and Contemporary Issues in Energy Utilities Programs
1992	*Mergers in the Electric Utility Industry*
	Joint Session of the American Economic Association Transportation and Public Utility Group and the Association for Evolutionary Economics Annual Meetings
1992	*Regulation and Sharing Rules*
	Graduate Economics Lecture Series, Northeastern Illinois University
1992	*Efficiency and Productivity Consequences of Private Network vs. Public Switched Telecommunication Network Development*
	Columbia University
1992	*Values and Public Utility Regulation*
	Keynote Address, Society of Depreciation Professionals
1992	*Current Trends in the United States Natural Gas Industry*
	Osaka Gas Company, Osaka, Japan
1992	*Energy Programs at the University of Wisconsin*
	RENEW Wisconsin Conference
1992	*Telecommunications Market Trends and Regulation*
	Wisconsin Public Utility Institute Essentials of Telecommunications Regulation Program

1992	*Energy Utilities Industry Structure*
	Wisconsin Public Utility Institute Essentials of Energy Utilities and Regulation -- and Contemporary Issues in Energy Utilities Programs
1992	*Integrated Resource Planning and Regulation*
	Wisconsin Public Utility Institute Essentials of Energy Utilities and Regulation -- and Contemporary Issues in Energy Utilities Programs
1992	*Alternatives to Rate Base Regulation Incentive Systems and Rate Regulation*
	Wisconsin Public Utility Institute Essentials of Energy Utilities and Regulation -- and Contemporary Issues in Energy Utilities Programs
1991	*Regulation and Sharing Rules*
	Tienjin University, China
1991	*Environmental Externalities and Integrated Resource Planning*
	Conference on Integrated Resource Planning National Association of Regulatory Utility Commissioners
1991	*Incorporating Environmental Externalities into Benefit/Cost Evaluations of Projects*
	Ministry of Construction, China
1991	*Valuing Electric Power Security*
	Wisconsin Public Utility Institute Campus Seminar
	Forces for Change in the Electric Industry
	Wisconsin Public Utility Institute and American Public Power Association Senior Executive Program
1990	*Price Caps and Telecommunication Regulation*
	BellCore/Bell Canada Research Conference on Telecommunication Demand
1990	*Measuring Productivity in the Japanese Telecommunications Industry*
	BellCore/Bell Canada Research Conference on Telecommunication Demand
1990	*Economics, Externalities, and the Environment*
	Environmental Task Force, Edison Electric Institute

1990	*Changing Trends in Electric Utility Competition*
	Chubu Electric Company Division of Corporate Planning, Nagoya, Japan
1990	*Public Power and Electric Utility Competition*
	Wisconsin Conference on Municipally - Owned Electric Utilities
1990	*Municipal Electric Utilities as Customers and Competitors*
	Wisconsin Power and Light Corporation.
1990	*Productivity and Performance in the Japanese Telecommunication Industry*
	Conference of the International Telecommunications Society, Venice, Italy
1990	*Regulation, Sharing Rules, and the Quality of Competition*
	American Economic Association Annual Meetings
1989	*Competition in the American Electric Utility Industry*
	Japan Society of Energy and Resources, Tokyo, Japan
1989	*Trends in Competition and Regulation in America*
	Osaka Gas Company Regulatory Economists Study Group, Osaka, Japan
1989	*Frontier Analysis of Sources of Inefficiency*
	Kobe University Department of Economics
	Tohokyu University Department of Economics
	Tsukuba University Department of Economics
	Osaka University Department of Economics
	Nanzan University School of Business
	University of British Columbia
1989	*The Total and Partial Factor Productivity of NTT*
	Research Institute of Telecommunication Policy and Economics, Tokyo, Japan
1989	*Measuring NTT Productivity*

	Nippon Telegraph & Telephone, International Division, Japan
1989	*Recent Developments in Electricity Pricing in the United States*
	Central Research Institute of the Electric Power Industry of Japan, Tokyo, Japan
1989	*Cost Function Analysis of Electric Utilities*
	Central Research Institute of the Electric Power Industry of Japan, Tokyo, Japan
1989	*Developments in the Japanese Telecommunications Markets*
	Korea Institute of Communications Science Conference on Telecommunication Policy, Seoul, Korea
1989	*Regulation in the United States*
	Department of Economics, Tongji University, Shanghai, China
1989	*The Total and Partial Factor Productivity of the Nippon Telegraph and Telephone Co.*
	Telecommunication Policy Research Conference, Airlie House, Virginia
1989	*Considering Transmission Reliability in Pricing Electricity Services*
	Annual Meeting of the Illinois Economic Association
1989	*Decomposing TFP Growth into Scale, Technological Innovation, Capacity Utilization, and Extent of Competition: An Application to Nippon Telegraph and Telephone Co.*
	Conference on Current Issues in Productivity Rutgers University
1989	*NTT's Productivity and the Effect of Competition*
	Transportation and Public Utility Group of the American Economic Association
1988	*Electric Utility Competition*
	Joint Conference of the Public Service Commission of Wisconsin, the Wisconsin Utility Association and the Wisconsin Public Utility Institute on the Role Of Competition in the Electric Utility Industry.
1988	*Economics, Values and Risks*

	Conference on Risk and the Environment. Institute of Environmental Studies and LaFollette Institute University of Wisconsin, Madison
1988	*Fundamentals of Energy Policy and Planning*
	Energy Policy and Planning Seminar Egyptian Ministry of Energy and Office for Energy Planning, Cairo, Egypt
1988	*Objectives for Energy Policy Development*
	Energy Policy and Planning Seminar Egyptian Ministry of Energy and Office for Energy Planning, Cairo, Egypt
1988	*Policy Fundamentals: Alternative Policy Instruments*
	Energy Policy and Planning Seminar Egyptian Ministry of Energy and Office for Energy Planning, Cairo, Egypt
1988	*Risk and Consequence Analysis*
	Energy Policy and Planning Seminar Egyptian Ministry of Energy and Office for Energy Planning, Cairo, Egypt
1988	*Energy Policy Options: Residential Sector*
	Energy Policy and Planning Seminar Egyptian Ministry of Energy and Office for Energy Planning, Cairo, Egypt
1988	*Energy Policy Implementation and Results Assessment*
	Energy Policy and Planning Seminar Egyptian Ministry of Energy and Office for Energy Planning, Cairo, Egypt
1988	*Measuring Productive Efficiency*
	Osaka University Institute of Social and Economic Research
1988	*Electric Utility Least Cost Planning*
	American Economic Association Annual Meetings Transportation and Public Utility Group

RESEARCH FUNDING AND OTHER GRANTS

1998 Business Ethics and Corporate Responsibility
Sabbatical Grant, University of Wisconsin, Madison

1998 Low Income Energy Policy Analysis, PI

Energy Center of Wisconsin

1988 Low Income Energy Modeling, Co-PI
Energy Center of Wisconsin

1996 Low Income Simulation Modeling, Co-PI
Energy Center of Wisconsin

1995 Services for Low-Income Energy Needs, Co-PI
Energy Center of Wisconsin

1994 Biomass Energy Infrastructure, Program Funding
Energy Foundation, Wisconsin Electric Utilities, Wisconsin Energy Bureau, Oak Ridge National Laboratory, Great Lakes Regional Biomass Energy Program, USDA Forest Service, Electric Power Research Institute, UW-Madison Biotechnology Center

1991 - 1995

PA and RA Support for Energy Research

[note: these are support possitions that I initiated, negociated, and oversaw while the Chair of the IES Energy Analysis and Policy Program. All positions were funded by research grants to the University of Wisconsin, Madison by the respective organization I was PI on each research proposal submitted from the University to the organization.]

SOURCE	NUMBERS
Wisconsin Center for Demand Side Research	1994-5 2 PAs and 2 RAs 1993-4 2 PAs and 1 RA 1992-3 3 PAs 1991-2 3 PAs and 1 RA
Wisconsin Demand Side Demonstrations	1994-5 2 PAs 1993-4 2 PAs 1992-3 2 PAs
HBRS	1992-3 1 PA 1991-2 1 PA
Wisconsin Energy Conservation Consulting Group	1992-3 1 PA 1991-2 1 PA
MSB and Associates	1993-4 3 PAs 1992-3 3 PAs
Xenergy	1994-5 2 PAs 1993-4 1 PA 1992-3 2 PAs
Wisconsin Energy Bureau	1994-5 2 PAs 1993-4 1 PA

Resource Management Associates	1994-5 2 PAs 1993-4 2 PAs 1992-3 2 PAs 1991-2 2 PAs

1992 Funding for Human Values and the Environment Program Funding
Wisconsin Council of the Humanities

1991 Cost Benefit Analysis and Investment Planning
Research Institute of Standards and Norms, Ministry of Construction, China

1989 Regulatory Policies and Structural Change: Electric Utility Mergers, Co-PI
La Follette Institute, University of Wisconsin, Madison

1988 Japanese Telecommunication Policy
University of Wisconsin Ameritech Grants Program

1988 Japanese Telecommunication Productivity
School of Business, University of Wisconsin, Madison

1988 Japanese Energy Policy
Sabbatical Grant, University of Wisconsin, Madison

1981 Frontier Estimation and Total Factor Productivity Measurement
Graduate School Research Committee, University of Wisconsin, Madison

1980 Issues in Frontier Estimation
Graduate School Research Committee, University of Wisconsin, Madison

1979 Measuring Comparative Efficiencies Through Stochastic Frontier Estimation
Graduate School Research Committee, University of Wisconsin, Madison

1978 Comparative Efficiency of Publicly and Privately Owned Utilities
Institute of Public Utilities, Michigan State University

1978 The Measurement of Firm Productivity in Publicly Regulated Industries: A Comparative Assessment
National Science Foundation

1978 Comparative Efficiencies of Publicly and Privately Owned Utilities
Graduate School Research Committee, University of Wisconsin, Madison

1977 The Measurement of Total Factor Productivity in the Electric Utility Industry
Graduate School Research Committee, University of Wisconsin, Madison

1977 Evaluating Competition in the Regulated Electric Utility Industry
National Science Foundation

1976 Assessing the Desirability of Competition in the Regulated Electric Utility Industry
Graduate School Research Committee, University of Wisconsin, Madison

PUBLIC AND PROFESSIONAL SERVICE

Expert Consultant

American Public Power Association
Anaheim, Riverside, Banning, Colton, and Azusa, California Municipal Utilities
Bureau of Economic Development, Ministry of Energy, Republic of the Philippines
Canadian Airlines
Center for Public Representation, Wisconsin
Committee for Public Utility Education, Nevada
Connecticut Municipal Electric Cooperative
Illinois Commerce Commission
Kansas Corporation Commission
Ketron, Inc.
Ministry of Energy, Republic of Egypt
Missouri Governor’s Commission on Telecommunications Reform
New Mexico Public Service Commission
New York Consumer Protection Board
Office of Technology Assessment, United States Congress
Ontario Hydro, Canada
Pennsylvania Public Utility Commission
Public Service Commission of Wisconsin
Research Institute of Standards and Norms, Peoples' Republic of China
Resource Consulting Group
Resource Management Associates
Tecknekron, Inc.
United States Department of Energy
Unitel CNCP, Inc., Canada
University of the Philippines
Utah Committee on Consumer Services
Wisconsin Department of Justice
Wisconsin Environmental Decade
Wisconsin Governor's Telecommunications Infrastructure Task Force
Wisconsin Office of State Planning and Energy
Wisconsin Public Service Company

GOVERNMENT COMMITTEES AND TASK FORCES

Various Years	Employment Examination Board, Public Service Commission of Wisconsin
1992-93	Wisconsin Legislative Council Select Committee on Energy Policy
1985	U.S. Congress Office of Technology Assessment Electric Utility Technology and Policy Panel
1984	Wisconsin Legislature Special Committee on Telecommunications
1984	National Task Force on Low Income Energy Conservation and Utilization National Association for State Community Services Programs
1980-81	Wisconsin Legislature Select Committee on Utility Rates
1979	U.S. Department of Energy Project Proposal Review Team
1978-83	Madison Development Corporation, Board of Directors Chairperson of Board of Directors 1980-83
1978	New York Consumer Protection Board Research Advisory Board
1977	U.S. Congress Office of Technology Assessment National Energy Plan Impacts Assessment Panel
1977	Employment Examination Board, WI Office of State Planning and Energy
1976	Governor's Task Force on Fuel and Utility Payment Problems, Wisconsin

Academic Associations

Allied Social Science Association
Executive Officer - 2001
Executive Officer - 1989

American Economic Association
Transportation and Public Utility Group
Chairperson - 1989
Vice Chairperson - 1988
Executive Committee - 1988-92

Association for Evolutionary Economics
President – 2001
President Elect – Program Organizer - 2000
Board of Directors - 1994-1996, 2000 - 2002
Nominations Committee - 1992

The Econometric Society

International Association of Energy Economists

University Committees

University of Wisconsin Madison

Faculty Senate
Campus Diversity Climate Committee, Chair

School of Business

Diversity Committee
Wisconsin Public Utility Institute, Director
Ph.D. Committee
Masters Committee
Library Committee, Chair
Research Committee
Computer Committee
Computer Staff Search Committee
John R. Commons Lecture Committee
Political, Legal, and Ethical Environments Search Committee
Ethics Chair Search Committee
Management Institute Public Utility Search Committee

Institute for Environmental Studies

Energy Analysis and Policy Program Faculty (Chair, 1992-1997)
Air Resource Management Program Faculty
Land Resources Program Faculty
Water Resources Management Program Faculty
Energy Analysis and Policy Admissions Committee
Energy Analysis and Policy Awards Committee
IES Council
IES Graduate Programs Committee
IES Curriculum Committee
IES Awards Committee
IES Budgets and Administration Committee
IES Center for Human Systems
IES Risk Group
Chair, Ecology, Philosophy and Theology Conference Steering Committee

Other University of Wisconsin, Madison

Center for Human Performance and Risk Analysis
Board of Advisors, College of Engineering

Institute for Legal Studies
Disputes Processing Research Program Executive Committee

East Asia Area Studies Program
Oversight Committee

International Engineering Program
Philippine Graduate Energy Engineering Project
Egyptian Energy Project

Reviewer

Academic Press
American Economic Review
Asian Institute of Technology
Columbia Journal of World Business
Econometrica
International Economic Review
Journal of Business and Economic Statistics
Journal of Econometrics
Journal of Economic Issues
Journal of Industrial Economics
Journal of Public, Urban and Regional Policy
Journal of Productivity Analysis
Journal of the American Statistical Association
Land Economics
National Science Foundation
Review of Economics and Statistics
Review of Industrial Organization
Southern Economic Journal
University of Wisconsin Press

Boards of Directors

From – 98	Internal Advisory Board Center for Human Performance in Complex Systems College of Engineering, University of Wisconsin, Madison
From – 98	Board of Advisors The Center for a Competitive Waste Industry
1990 - 98	Corporate Secretary and Board of Directors Energy Center of Wisconsin
1993 - 97	Corporate Vice-President and Board of Trustees International Committee for a Peace Council
1990 - 97	Board of Directors National Regulatory Research Institute National Association of Regulatory Utility Commissioners
1983 - 84	Board of Directors Madison Capital Corporation
1980 - 84	Board of Directors - Chairman 1981-1984 Madison Development Corporation

Other Service

2001 -	Rotary International Ethics Symposium Steering Committee
2001 -	Wisconsin Association of Security Analysists Business Ethics Awards Steering Committee

HONORS AND AWARDS

2000 Distinguished Member Award
Transportation and Public Utility Group of the American Economic Association
"honoring a Transportation and Public Utility Group member who has made significant contributions to the field … [and has] enjoyed a full and distinguished career."

1999 Distinguished Service Award
Energy Center of Wisconsin

1999 Final Two Corporate Board of Directors Search
New York Integrated Service, Corp. (controsl state wide electric utility transmission)

1998 Distinguished Service Award
National Regulatory Research Institute
National Association of Regulatory Commissioners

1987 Robert A. Jerred Distinguished Service Award
Graduate School of Business, University of Wisconsin-Madison

1975 Outstanding Performance Award
United States Federal Power Commission

1964 - 1968
Honorary Societies Monmouth College

Omicron Delta Epsilon	Economics Honorary Society
Phi Gamma Mu	Social Science Honorary Society
Phi Kappa Delta	Forensic Honorary Society
Sigma Tau Delta	English Honorary Society
Blue Key	Academic Honorary Society

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