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Issues in Hazardous Waste Management: Discussion

Robert Raucher

Metcalf, Dudek and Willis provide a useful illustration of the basic mass balance problem—that piecemeal, media-specific environmental control policies can shift wastes from one media to another. Their research focuses on how water pollution control (“pretreatment”) requirements in the electroplating industry may generate toxic sludges requiring appropriate landfilling as hazardous wastes.

Their mixed integer cost minimization algorithm, and the cross-media results generated, are reasonable. The authors show concentration-based pretreatment standards (i.e., limiting pollutant mass per volume of wastewater) leading to a significant increase in sludge production. They also run their model with a waste-end tax (a per liter charge on sludge disposal) in the absence of pretreatment standards. Under this scenario, sludge generation is reduced but the residual metals discharged in wastewater is increased dramatically. When both policies are simulated simultaneously, the results indicate that even significantly increasing the waste-end tax (by more than a factor of four relative to the no pretreatment scenario), the economic pressure to generate sludge is substantial (roughly eight times the volumes of sludge generated than in the no pretreatment scenario).

While these findings are plausible and illustrative of mass balance tradeoffs across media, the paper could be enhanced with analyses of additional policy issues. For example, would the use of *mass based* (i.e., pollutant mass per product output) pretreatment standards, rather than *concentration based* limits, have avoided the dilution problem Metcalf, Dudek and Willis cite? What level of waste-end tax, in conjunction with pretreatment requirements, would switch firms to waste reduction (recovery of recycling) technologies? This is an important issue to consider given the environmental realities imposed by the mass balance approach.

The basic mass balance issue—that absent waste reduction, toxic substances will go somewhere—raises an important issue: Where should society want them? This is an interesting issue that MDW can pursue with their modeling capabilities. Assigning damage functions to pollutant loads, by media, would allow one to determine the socially optimal mix of environmental receptors of waste streams. Then, one could solve for the mix of media-specific policies (standards, taxes, etc.) that would produce this optimum allocation of hazardous wastes.

In sum, the Metcalf, Dudek and Willis paper is useful, and additional applications of their approach would produce further important insights.

Opaluch approaches the hazardous waste issue from a traditional property rights perspective—exploring whether strict liability would be an effective alternative to standard regulatory schemes (including those with market-type institutions as major components). Opaluch makes an important contribution by incorporating the “anchoring” problem (as defined by Tversky and Kahnemann) into his assessment of the strict liability option.

Opaluch establishes a conceptual framework in which risk neutral firms minimize expected losses given their perceived probabilities of hazardous substance pollution events. These losses include the value of lost product, clean-up and control costs, plus full liability for social damages. Under ideal conditions of perfect information, strict liability would lead to the full internalization of all social costs and, hence, optimal levels of pollution control/accident prevention. Perfect information would include zero transaction (including legal) costs, correct valuation of social welfare losses, and costless, perfect enforcement. These aspects are overlooked by Opaluch in favor of another symptom of imperfect information. This is the anchoring problem, through which firms may underestimate the probability of a hazardous substance pollution incident.

A simulation model of oil spills is used to indicate the social losses due to anchoring to prior probability estimates. From these results, Opaluch concludes that excessive confidence in current technologies, as embodied in underestimated failure probabilities and insufficient updating, indicates that strict liability rules cannot fully internalize social costs. Hence, Opaluch states that some form of direct regulation may be justified.

This paper raises several issues. First, limitations of strict liability have been widely discussed in the literature, and the nonanchoring aspects deserve some mention by the author. An especially relevant concern is enforcement. One needs certain detection, perfect attribution, and complete collection in order for expected settlement to equal social loss.

Second, if anchoring regarding technology failure and subsequent pollution incidents is a reality, then how might one solve the problem? That is, even if strict liability rules would optimize but for anchoring, then what type of policy is most appropriate? To support a regulatory scheme, one implicitly as-

sumes that 1) the true probability distribution is known by relevant public bodies, and 2) that this information asymmetry cannot be resolved more efficiently through an information dissemination policy. If the true distribution is unknown to both public and private sectors, then government intervention is appropriate only if public bodies are less anchored than their private counterparts. And, if the public sector is insufficiently anchored, as may be the case when a pollution incident captures the citizens' attention (e.g., Love Canal) and their

pressure for a government response induces an overreaction, then the relative efficiency of outcomes is unclear.

In sum, on a conceptual level the anchoring phenomenon may have important implications for regulatory and nonregulatory approaches to controlling hazardous wastes. It remains an empirical question as to the extent to which anchoring occurs in both the public and private sectors. And, more work needs to be done on the policy implications of this potential phenomenon.