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Inside...

SUSTAINABLE REGULATION

WEAVING SUSTAINABILITY INTO REGULATORY DECISIONS

by J. Mark Morford, Stoel Rives LLP (Portland)

Introduction

As our communities, our nation and the world begin to embrace sustainability, one might expect sustainability concepts to be central to the decision-making processes of those agencies charged with protecting the environment — but this is not yet the case. Although some sustainability concepts have crept into agency decisions through practical logic and the efforts of a few crusaders, compartmentalization of environmental laws, and of the agencies who administer them, discourage the holistic thinking critical to sustainability.

The term "sustainability" has become so widely applied that any discussion of sustainability concepts must begin with a definition. One generally accepted definition of sustainability or sustainable development comes from the World Commission on Environment and Development, paraphrased here as: actions that that meet the needs of the present without compromising the ability of future generations to meet their needs [see G.H. Brundtland (Chair), *Our Common Future, World Commission on Environment and Development*, Oxford University Press, New York, 1987].

Various interest groups have attempted to promote a wide range of social goals by redefining sustainability to incorporate concepts of environmental justice, promotion of local economies, organic farming, eradication of genetically modified crops, elimination of nuclear weapons, socialized medicine, income redistribution, gay rights, animal rights and abortion rights. This article will avoid these tempting social issues and focus instead on the sustainability principals of minimizing pollution, energy consumption and resource consumption.

Sustainability at DEQ

Just as for most other organizations, sustainability has both internal and external components for governmental agencies. By executive order in 2003, Governor Kulongoski directed Oregon agencies to develop and implement plans for improving the sustainability of their operations [see Executive Order EP-03-03, *A Sustainable Oregon for the 21st Century* (June 17, 2003)]. Oregon's primary environmental agency, the Department of Environmental Quality (DEQ), has been implementing this executive order through a plan to reduce the earth-impact of its operations. DEQ's plan focuses on the typical targets of office-based organizations, such as reducing paper use, recycling materials, reducing vehicle use and encouraging employee commute alternatives [see DEQ Sustainability Plan Progress Statement (September 2008)]. More recently, DEQ determined to adopt The Natural Step framework, which will involve creating a vision of a more sustainable agency and developing plans to achieve that vision (author's interview of Wendy Wiles, DEQ Sustainability Coordinator (October 3, 2008)).

Although DEQ also is striving to use its authority to promote sustainability principals more generally, its accomplishments to date have been limited. In particular, consideration of sustainability in regulatory decisions has been constrained both by the bounds of the existing regulatory schemes and by mistrust of the economic motivations of regulated industry.

Sustainable Regulation

Single-Focus Goals of Environmental Programs

"SINGULAR" COMPLIANCE POINTS THWART HOLISTIC ANALYSIS

For decades, regulated entities (sources) have complained about the cost of complying with regulations that include seemingly illogical requirements to consume large amounts of limited natural resources and create more waste and pollution in the pursuit of singular environmental goals.

Clean Air Act Examples

Contradictory Requirements

Possibly, the clearest examples of such contradictory requirements find their origin in the federal Clean Air Act, which has an explicit and narrow goal of reducing air pollution from certain specified pollutants — without meaningful consideration of other environmental impacts. Based on dated environmental management concepts, the Clean Air Act typically emphasizes controlling air pollution at a source's stack to the exclusion of considering any other aspect of the source's operations. Clean Air Act rules impose emission limits typically based on the level of control that can be achieved by advanced capture and destruction technologies. How the source actually achieves the emission limit is partially left up to the source, but typically a source has little choice but to use the identified technologies which often have significant environmental impacts.

VOC/BACT Example

For example, a source of **v**olatile **o**rganic **c**ompounds (VOC) might be subject to very low emission limits based on the **b**est **a**vailable **c**ontrol **t**echnology (BACT). Technologies that capture the emissions and incinerate them typically achieve the lowest VOC emissions and thus constitute BACT. VOC incineration, however, is very energy intensive — requiring combustion of vast quantities of natural gas to achieve incineration temperatures in the process exhaust. The net result is the release of tons of CO_2 to destroy a few pounds of VOC. In addition, such incinerators produce other pollutants from the combustion of natural gas, such as formaldehyde and nitrogen oxide. The cost of such controls is extraordinary and can involve a million dollars or more in control equipment and similar amounts in annual operating costs. For less money, the industrial source might be able to dramatically reduce its VOC emissions through process changes involving far less net environmental impact, but those process changes would not achieve the same emissions levels that can be achieved by incineration. Ironically, incineration of a low concentration VOC stream requires even more natural gas than for a high concentration VOC stream; so the facility has no motivation to curb VOC use to lessen incineration costs.

Although DEQ permit writers may be sympathetic to such perverse results, they also may be powerless to avoid them. "BACT is BACT," they may say, and the Clean Air Act mandates that new sources achieve the BACT level of control. Although cost and energy consumption are considerations in the selection of BACT, the role of these considerations is very limited. Neither the source nor DEQ has any regulatory impetus to conduct a holistic analysis to determine whether a particular control technology provides a net environmental benefit. The applicable rules do not provide a basis for balancing other environmental impacts against the reduced emissions that a particular technology can achieve.

Clean Water Act Examples

Balance Lacking

Law Suits

Examining the federal Clean Water Act yields similar examples. Under this Act, states set water quality standards that must be achieved in surface water bodies. Again, the singular goals set out in the standards must be achieved no matter what consumption of energy and natural resources is necessary. In some cases where DEQ has attempted to strike some balance between competing environmental impacts, zealous environmental activists have sued the agency to force strict interpretation of the water quality standards and rules, seemingly without regard for the collateral environmental damage and foregone environmental opportunities brought about by such legal actions.

Reducing Use

Interestingly, one of the best ways to reduce the net environmental impact of wastewater discharges is to reduce water use and wastewater flow. Reducing the flow of process water reduces the consumption of fresh water, reduces the energy necessary to pump the water and treat it, and generally results in reduced pollutant loads throughout a waste stream. All these aspects of reduced water/wastewater flow further sustainability goals. However, even though the total mass load of the pollutants is substantially less, reduced flow often results in higher concentrations of some pollutants in the wastewater. These higher concentrations can present problems for sources subject to pretreatment standards that impose strict limits

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Sustainable Regulation

on the concentration of pollutants in their effluent. Regulatory mixing zones allow water quality standards to be exceeded in a small area around a discharge, but require water quality standards to be met at the edge of a mixing zone. Because low flow discharges may have high concentrations of pollutants, regulatory mixing zones are critical to water use reduction strategies for reducing pollutant loads (as opposed to concentrations). However, some environmental activists are still campaigning vigorously to ban mixing zones entirely.

Time Considerations

Time is another consideration. It might take a decade or more for a facility to achieve, in an economically viable fashion, all the process changes necessary to reduce flow to levels that achieve compliance goals. Agencies and environmental groups, however, insist on immediate compliance. As effluent limits become progressively more stringent, a facility's sunk investment in end-of-pipe controls may strongly discourage further investment in process changes and flow reduction that would be far more environmentally beneficial. Financial and personnel resources spent on immediate compliance through end-of-pipe controls cannot be reclaimed for making process changes that would produce more sustainable results.

Blue Heron Success

In a recent success story, DEQ, Blue Heron Paper Company and Willamette Riverkeeper agreed to just such a water use reduction strategy for achieving water quality standards. Blue Heron has had difficulty meeting effluent limits established to satisfy the turbidity water quality standard. Although technology is available for end-of-pipe control, the technology consumes significant resources and energy. Possibly more important to Blue Heron, the cost of end-of-pipe control is beyond its means. Faced with this cost, Blue Heron's engineers developed a strategy for dramatically reducing the mill's water use (by almost half) and achieving commensurate reductions in the mass loads (or heat loads) for most of the pollutants it discharges. By recycling wastewater within the mill, Blue Heron also found that it could significantly reduce its energy consumption. This strategy, however, required years of engineering, testing, implementation and adjustment for each of several stages of reductions, each of which needed to be implemented sequentially. When DEQ gave Blue Heron a compliance schedule in its permit to allow the time necessary to implement the water use reduction strategy, Willamette Riverkeeper challenged the permit. Through education and by committing to new permit limits to enforce the various pollutant load reductions, Blue Heron convinced Willamette Riverkeeper that this approach is more environmentally beneficial than end-of-pipe controls. The parties settled the law suit in December, and DEQ has just proposed a revised permit for public comment (see DEQ website: www.deq.state.or.us/news/publicnotices/PN.asp). Such solutions, however, seldom occur and require tremendous creativity, mutual trust and an open-minded approach by DEQ, the source and the public. They may also require stretching the interpretation of existing water quality rules.

Reduced Use

Challenged Permit

Negotiations Successful

Recycling

HEAVY REGULATORY BURDEN

Mature Markets

Waste management programs were the first to embrace sustainability concepts many years ago. Taking to heart the "reduce, reuse, recycle" mantra, industry and government have found myriad ways to limit the generation of hazardous waste and non-hazardous solid waste. Mature markets and whole economic sectors have evolved around the recycling of a plethora of common wastes. Many of these commercial arrangements are so well established that few of us even think of them as recycling. For example, hog fuel used to fire many boilers around the state, once considered waste, is now a valuable commodity with a robust market. Scrap steel, glass cullet and many other recycled commodities have similarly well established markets.

DEQ Actions

DEQ, however, sees risk in some of these recycling arrangements and is seeking to regulate them. In particular, DEQ is concerned that waste sands and similar materials may contain levels of naturally occurring metals above conservative risk-based screening values it uses in its cleanup program. In the past year, DEQ has revoked several approval letters it previously issued to steel foundries to allow casting sands to be used as road base and structural fill. DEQ expressed concern that there is a possibility that the foundry sands might slightly exceed screening values, even though the sands are not placed where there is a meaningful risk of human exposure. As a result, thousands of tons of otherwise useable foundry sand are going to landfills, while virgin soil and sand must be mined to fill the construction demand. In addition to consuming landfill space and natural resources, the result is twice the amount of transportation and heavy equipment emissions as recycling would produce (i.e., both the waste sand and the virgin sand must be handled and transported, which results in roughly twice the transportation and handling necessary if waste sand were reused).

Foundry Sands

Sustainable Regulation

Appropriate Trade-Offs?

Frustration?

Screening Values v. Environmental Costs

Fear of Shams

Reducing Theoretical Risks

Dig-and-Haul Costs

Cancer Risks

Dig-and-Haul Cost Estimates

To allay its concerns, DEQ has even drafted rules that would require the agency's approval of every beneficial use of solid waste and would impose annual fees and reporting requirements on each transaction (see Brief, this ***Insider***). In deliberations about these draft rules, DEQ has expressed worry that recycling could result in commercial products containing contaminants. DEQ's logic ignores the fact that products made from virgin materials also contain a wide range of hazardous substances. Glass made from virgin sand contains the same minerals as glass made from recycled bottles. Asphalt is full of petroleum compounds and metals whether virgin sand or foundry sand is used as filler. These rules under consideration would impose a significant financial burden on many existing recycling arrangements, which in many cases would render them not economically viable. Rather than encouraging recycling, DEQ in this case appears to be headed in the direction of frustrating it. DEQ is focused solely on eliminating every possibility that contaminants in recycled waste theoretically could make their way into the environment at levels above DEQ very conservative screening values, rather than considering the full range of environmental costs and impacts at play in these decisions. [Regarding this rulemaking see DEQ's Solid Waste website: www.deq.state.or.us/lq/sw/disposal/benefiialuse.htm or contact Tom Roick, DEQ project manager, 503/ 229-5502; email: roick.tom@deq.state.or.us]

Recycling is discouraged most strongly for hazardous waste regulations under the federal Resource Conservation and Recovery Act. In contradiction of its name, this Act and US Environmental Protection Agency's (EPA's) rules promulgated under it regulate recycling of hazardous waste similarly to the way the Act regulates hazardous waste disposal facilities. These regulations arise out of fear that hazardous waste generators will use sham recycling as a ruse to get rid of hazardous wastes. Rather than regulating the shams, however, the rules create often insurmountable obstacles and costs for all recycling opportunities. Contrary to the common public perception, the bulk of the volume of hazardous wastes are materials with relatively low toxicity that could be easily recycled but for regulatory constraints. In many cases, the very properties that make hazardous wastes hazardous also make them valuable for recycling. The value, however, often is not great enough to overcome the regulatory cost of recycling. EPA recently issued revisions to its dated recycling rules that make some types of recycling easier [see 73 Fed Reg 64668 (October 30, 2008)]. The new rules, for example, recognize that legitimate recycling may not produce a profit; whereas EPA's historic policies considered a recycling arrangement to be a sham if the generator paid the recycler to take the waste. Even these rules, however, still carry heavy regulatory burdens.

Cleanup Programs

UNSUSTAINABLE REMEDIAL ACTIONS

Arguably, environmental cleanup programs are precisely where sustainability concepts should be of particular importance. Ironically, it is in these programs that they are most ignored. The primary purpose of remedial action under cleanup programs is to reduce the presence of certain pollutants in the environment. This singular focus on hazardous substances, however, can produce deep environmental insults as the price for modest and often highly theoretical reduction in risks from hazardous substances contamination.

The most common remedial technology is removal and offsite disposal of contaminated media. These dig-and-haul remedies gobble fossil fuels to provide energy for excavation and transportation of contaminated soil — sometimes to landfills hundreds of miles away. Complementary amounts of fuel are then necessary to mine backfill material, transport it to the site and compact it to replace the removed soil. In the process, we consume landfill space and the mined backfill.

DEQ and their counterparts in other states require these remedies to ensure that a future user of the site is not exposed to contaminants in the soil that could increase that person's excess cancer risk by more than one-in-one million. This incremental cancer risk is trivial compared to the national average lifetime cancer risk of one-in-371,400 [see National Cancer Institute, SEER Cancer Statistics Review, 1975-2005, Table I-14 — available from website: http://seer.cancer.gov/csr/1975_2005/index.html]. The risk of exposure to such contaminants is almost always highly speculative and is calculated using very conservative assumptions about how much time a person might spend at the most contaminated part of the site and how much soil that person will ingest from just that contaminated spot.

The environmental costs of a dig-and-haul remedy, however, are not speculative. The trucks and excavation equipment will emit greenhouse gases and other pollutants, and the volume of emissions can be estimated with a high level of certainty. One can similarly estimate the consumption of fossil fuels. In addition, the remedy will necessarily consume a known amount of landfill space and backfill material. The risk of worker injuries and traffic fatalities from moving large quantities of soil also can be predicted with a high level of actuarial confidence. In the typical remedy selection process, however, most of these environmental impacts and risks are given no more than a passing comment or are ignored entirely.

Sustainable Regulation

Portland Rights-of-Way Trade-Offs

The City of Portland takes this imbalance of speculative risk and certain environmental impacts to extremes in its public roads policy. As a matter of policy, the City insists that all contaminated soil in road rights of way be excavated to five feet and replaced by clean soil [see City of Portland Contaminated Site Redevelopment Policy for Public Rights of Way]. One might safely assume that as long as the soil is left undisturbed below paved streets, the public is not exposed to such contamination. The City, however, wants to be certain that its workers who might excavate soil for future utility repairs will have no risk from hazardous substance exposure. Unfortunately, the cost of this policy is 100 percent certainty that excavation workers will be exposed to the soil during remediation and that all the detrimental environmental impacts of dig-and-haul remedies will occur — and at a large scale.

Hogged Energy

Treatment technologies can have similar environmental costs. Thermal treatment is an energy hog. Groundwater pump-and-treat remedies consume dramatic amounts of energy when the many years usually necessary for these technologies to perform are considered. At the extreme are dig-and-haul remedies that also require incineration of the soil before it is landfilled (to comply with land disposal restrictions for certain hazardous wastes).

Cleanup Law Myopia

The Oregon Cleanup Law, like the federal Comprehensive Environmental Response, Compensation and Liability Act, compels DEQ to balance a range of factors when selecting a remedial action. Among these remedy selection criteria is consideration of "short term risk . . . to the community, to those engaged in the implementation of the remedy and to the environment." ORS 465.315(1)(d)(D). Although this remedy selection criterion could be interpreted to include collateral environmental impacts, typically it receives little attention in the feasibility study and then only with respect to the risk of traffic fatalities. More surprising, these laws do not specifically direct DEQ to select the remedy with the least environmental impact. To the contrary, these laws strongly prefer removal and treatment technologies for the contamination above certain thresholds (referred to as hot spots), even though removal and treatment remedial technologies are most likely to have the greatest collateral environmental impacts.

Alternatives Explored

Recognizing the blow to sustainability that remediation decisions can have, DuPont has helped to organize an international group of agency, engineering, academic and industry representatives to explore these issues. That group, known as the Sustainable Remediation Forum (SURF) is striving to develop a framework for considering sustainability concepts in remediation. Oregon's DEQ is participating in SURF along with many other states. EPA Region 9 is engaged in a complimentary effort to define "green remediation."

"Green Remediation"

EPA Region 9 appears focused principally on the more tactical decisions, such as promoting renewable energy for remedy electricity demands and reusing demolition debris (see, e.g., www.epa.gov/tio/tsp/download/2007_fall_meeting/tues-gill.pdf). SURF, on the other hand, is looking more broadly at the range of environmental impacts and exploring consideration of these factors at the remedy selection phase. Fundamentally, the threshold for sustainability in remediation should be that the remedy produce a net environmental benefit. If it does not, one has to question why remedial action is an appropriate choice at all. Remediation, after all, is intended to be restorative.

While an agreed upon definition of sustainable remediation remains elusive, a range of sustainability factors agencies could consider have been identified.

Sustainability Considerations

SUSTAINABLE REMEDIATION CONSIDERATIONS INCLUDE:

- Total remedy carbon footprint (energy consumption on and offsite, including energy to produce equipment and materials consumed by the remedy)
- Air and water impacts, both short and long term
- Offsite environmental impacts, such as consumption of landfill space and impacts from mining natural resources
- Ecological impacts of the remedial activities on and offsite
- Transportation risk from vehicle miles traveled
- Occupational risk to remediation workers
- Environmental impacts from the offsite production of the materials and equipment used in the remedy

Rational Remedies?

By considering the full environmental impact of various remedial choices, agencies and responsible parties can reach more rational remedy decisions. At a minimum, such consideration should avoid the selection of remedies that result in obvious environmental harm (such as dredging or capping sediment that supports a viable, if not ideal, ecology). Done well, such balancing of factors should yield true environmental benefits and not just reductions in hypothetical risks.

Sustainable Regulation

An example of the application of sustainability principals to remedy selection is the remediation of soil contamination at firing ranges at Camp Withycombe. In that remedy selection, DEQ worked with the Oregon Army National Guard to incorporate sustainability concepts into remedy selection. As a result, DEQ selected onsite soil treatment rather than the more typical dig-and-haul remedy, thus avoiding the emission of almost two million pounds of CO_2 and other pollutants. The remedy also featured other sustainability concepts, including: use of recycled materials; relocation of removed trees; reuse of process water for irrigation and recycling of asphalt; and recovery of more than 270 tons of lead bullets for recycling. In the process, the National Guard saved millions of dollars by not employing dig-and-haul remediation. Even in this example, however, one can ask whether the environment is really better off for consuming an extraordinary amount of fuel and emitting the attendant CO_2 than it would be if no remedy had been implemented or if a much less intrusive remedy had been chosen.

Although not ideal, Oregon and federal cleanup laws do allow the agencies to include or even emphasize sustainability principals in remedy selection. For example, implementation risk is a balancing factor to be considered by DEQ in remedy selection. OAR 340-122-0090(3)(d). Environmental impacts of a remedy could therefore be considered as an implementation risk.

What is necessary to achieve more environmentally responsible remedy selection is a mind shift to emphasize net environmental benefit over a dogmatic preference for intrusive remedies that achieve greater reductions in the theoretical risks associated with each contaminated site. To fully incorporate sustainability principals into remedy selection, however, probably requires revising the Oregon Cleanup Law to mandate consideration of net environmental benefit.

Conclusions

COST CONSIDERATIONS - OPPORTUNITIES

Interestingly, sustainability concepts frequently produce lower cost actions. The Blue Heron water use reduction strategy mentioned above is a good example. Even in an imperfect market where environmental costs are not fully internalized, cost represents consumption of resources. Minimizing consumption is at the heart of sustainability; so we can expect many sustainable choices to also reduce cost.

The direct proportionality of sustainability and cost presents the opportunity for widespread support from regulated industry for incorporating sustainability concepts into regulatory decisions. Enthusiasm from the regulated sector, however, is sure to draw deep skepticism from some environmental groups and some regulators. Conversely, promotion of sustainability concepts by public interest groups draws suspicion from the eyes of many industry leaders.

Maybe, just maybe, this mutual mistrust offers an opportunity for agencies like DEQ to take a leadership role by capitalizing on the interests of both sectors to build a level of cooperation seldom found in environmental regulations. Just imagine a air permitting process that results in the community and the permittee supporting process changes at a facility that cost less than end-of-pipe controls. Or imagine an environmental group advocating a control strategy that provides slightly less reduction of a targeted pollutant, but yields a strong net environmental benefit in reducing greenhouse gases, vehicle miles traveled or consumption of other resources.

Fulfilling such visions will require conscious inclusion of sustainability principals in regulatory decisions. Maximizing that potential, will require a progressive interpretation of existing laws and consideration of sustainability factors at every step of regulatory decision making. To truly reach comprehensive consideration of sustainability, however, probably will require overhaul of environmental laws that prescribe a narrow focus on only a subset of environmental impacts. To be true to sustainability principals, these laws must strive toward net environmental benefit — not just reducing pollutants in a single media.

As a state with a proud history of leading the nation to progressive environmental concepts, Oregon is ideally suited to be the incubator of change in environmental laws that emphasize true environmental benefit over singular reduction in pollution of a narrow media.

For Additional Information, Contact:
Mark Morford, Stoel Rives LLP, 503/ 294-9259 or email: jmmorford@stoel.com

Mark Morford is a partner in the environmental section of Stoel Rives LLP where he chairs the firm's sustainability committee and advises industrial clients on the full range of environmental challenges.

