Estimating Environmental Liabilities

One Price Does Not Fit All

by Edward Sullivan

Forecasting expected losses is a critical function of any position in which risk management professionals may be called upon to predict environmental liabilities in a number of different situations. These can range from establishing accounting reserves for environmental matters for financial reporting purposes (regulatory compliance), to the sale or purchase of environmentally impaired properties or brownfields, including mergers and acquisitions, and even the purchase of environmental insurance products.

Environmental liabilities are notoriously difficult to estimate given the high degree of uncertainty and contingent nature of environmental exposures such as cleanup costs and related liabilities (e.g., third party bodily injury, third party property damage, natural resource damages and toxic tort). Currently there is no commonly accepted method for estimating environmental costs. Corporations can apply many different methods, which can vary widely in their level of sophistication and rigor.

"One price does not fit all" signifies that when estimating environmental liabilities, there is almost never a single "price" that can be applied in every situation a risk manager faces, given the inherent uncertainties. There is almost always a range of potential costs based on different possible outcomes. This range of costs can be flexibly applied by risk managers in a number of different situations. Although risk managers may rely on cost estimates developed by the organization's environmental and financial experts, they should be familiar with the most commonly used methods for estimating environmental liabilities and their use and applicability in the situations listed above.

Forecasts and Estimations

The methods available for estimating environmental costs range from simple estimates based on a single assumed outcome to sophisticated probability and statistical analyses of multiple possible outcomes. These methods have evolved alongside the evolving regulatory requirements and best practices for financial analysis.

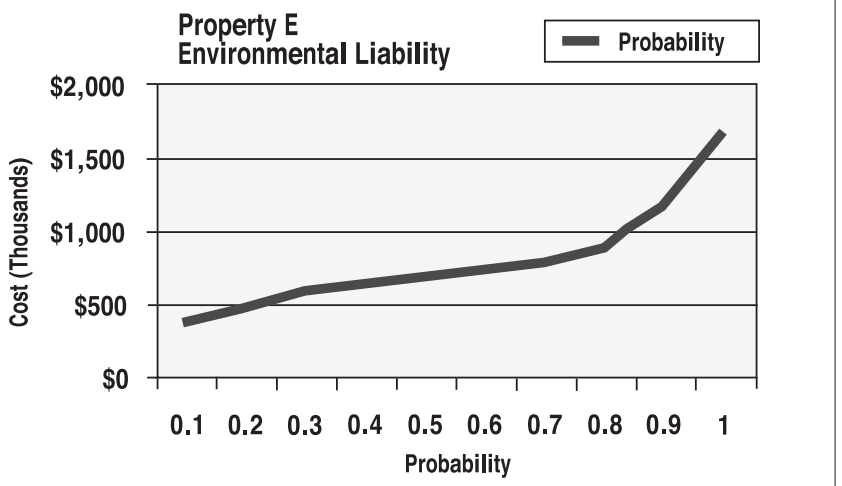
As an illustrative example, consider a situation in which a corporation needs to estimate liabilities associated with a portfolio of five properties either for their financial statements or for the sale or divestiture of the properties. Each of the properties has soil or ground water contamination and associated future cleanup costs and associated liabilities.

Single outcome method. The simplest method for estimating the liabilities associated with these properties is the single outcome method. Future liability costs are

based on an engineering estimate for a single assumed outcome based solely on the professional judgment of the person creating the estimate. This method has its roots in Statement of Financial Accounting Standards No. 5 (FAS5), which was the first public standardization of accounting for contingent environmental liabilities in the United States.

ASTM methods. A more rigorous approach would include the analysis of uncertainty in the estimating process. Several methods are available to help account for uncertainty through probability analysis. The most frequently used methods are presented in the Association for Testing and Materials (ASTM) "Standard Guide for Estimating Monetary Costs and Liabilities for Environmental Matters" (ASTM E 2137), which was published in 2001. The ASTM standard describes four cost estimation approaches. In order of "most preferred" to "least preferred" (according to the standard) they are:

Figure 1 - Estimating Environmental Liabilities



Consider the possible estimate of environmental liabilities, on a net-present value (NPV) basis for five properties:

Property A: $250,000
Property B: $1,100,000
Property C: $530,000
Property D: $2,500,000
Property E: $800,000
Aggregate: $5,180,000

The shortcomings of this approach are obvious in that there is no way to evaluate the probable variation from expected losses. The overriding assumption is that the person who develops the estimate can accurately predict the future. This method is insufficient to meet the business-driven environmental activities of today, such as brownfields redevelopment and the placement of environmental insurance. The value in estimating liabilities for these activities is not in how well the engineering estimate is done but in how well the risks and potential cost variability are analyzed.

Expected value approach: The expected value of the cost of an environmental event is the estimate of the probability weighted-average over the range of all possible values where there are multiple possible outcomes, each with its own probability of occurrence. Using the example from above, Property E might be assigned the following costs and probabilities:

Scenario 1:
$400,000 cost, 10% probability
Scenario 2:
$600,000 cost, 20% probability
Scenario 3:
$800,000 cost, 40% probability
(This is the single outcome cost from above)
Scenario 4:
$1,500,000 cost, 30% probability
Expected Value: $930,000

Note that given the fairly high probability (30%) that the costs could be as much as $1.5 million, the expected value is somewhat higher than the single outcome estimate. The aggregate expected value for the portfolio would then be the sum of the individual expected values.

Most likely value approach: This method represents the cost of a scenario believed to be the "most likely" to occur. In the analysis above this would be the $800,000 estimate since it has the highest (40%) probability of occurrence.

Range of values approach: This approach develops a range of values without probabilities and is best used where probabilities for the various scenarios cannot be accurately estimated. The range of costs should cover costs from a low-cost estimate to a high-cost estimate based on reasonable assumptions.

Known minimum value approach: This approach is to be used when the outcome and cost uncertainties are so great that it is premature to estimate an expected value or most likely value. This approach only identifies those costs that are reasonably certain to be incurred. In the Property E example above, the known minimum value would be $400,000.

Although these methods incorporate probability analysis to one degree or another, at best they provide a fairly rudimentary analysis of what can be a very complex situation. None of the methods allows for a rigorous evaluation of variation from expected values or leaves much room for negotiation where there is more than one interested party.

Probabilistic Models

The most sophisticated methods for estimating environmental liabilities involve the use of probabilistic statistical models using multiple possible outcomes. The advantage to this approach is that it is possible to measure and analyze the probability of multiple outcomes. This approach allows for a more flexible and in-depth analysis of costs and variability and can provide the basis for negotiation

Reporting Environmental Liabilities in the Post-Sarbanes-Oxley Era

The passage of the Sarbanes-Oxley Act of 2002 has focused the microscope on corporate disclosure of environmental liabilities and may result in Securities and Exchange Commission (SEC) rule changes pertaining to financial disclosures. Since 1982 the SEC has mandated that U.S. corporations disclose environmental liabilities, including contingent liabilities. The current SEC rules relevant to the disclosure of environmental liabilities include:

- Item 101 of Regulation S-K: Requires disclosure of "material" effects of compliance with environmental laws.
- Item 103 of Regulation S-K: Requires a description of pending "material legal proceedings." Specifically, that environmental liabilities must be disclosed if the potential liability is material to the financial condition of the company or exceeds 10% of the company's total assets.
- Item 303 of Regulation S-K: Requires the disclosure of environmental contingencies that are reasonably likely to have a "material" impact on financial performance.

Corporate financial reporting is governed by a set of standard practices known as Generally Accepted Accounting Principles (GAAP). The GAAP for reporting environmental liabilities are set forth in a number of rules and position statements including Financial Accounting Standards Board (FASB) Statement of Financial Accounting Standards No. 5 (FAS 5), SEC Staff Accounting Bulletin 92 (SAB 92), and American Institute of Certified Public Accountants Statement of Position 96-1 (SOP 96-1). FAS-5 requires that a loss be recognized when it is both (1) probable and (2) the amount can be reasonably estimated. FAS 5 and SAB 92 also specify that if the amount of the liability is likely to fall within a range and one number in that range is more likely to occur, this value should be reported (see most likely value approach in main article). If no one value is more likely to occur than any other, then the lowest value in the range (see "*Known minimum value approach*" in main article) can be reported.

The variety of cost estimating methods combined with varying interpretations of the above SEC regulations has resulted in a great degree of inconsistency in how environmental liabilities have been valued and disclosed. Oftentimes the estimates do not adequately describe the extent of the incurred liabilities. A number of recent studies have indicated that there is a significant under reporting of environmental liabilities in SEC filings. These studies include a 1993 General Accounting Office (GAO) study, a 1998 EPA study and a 2002 SEC survey. The GAO indicated that liabilities were often carried at minimal (see known minimum value approach) or zero value because uncertainties prevented companies from estimating or reporting environmental liabilities. The GAO also reported that many companies interpreted SEC rules to require that only individual liabilities exceeding 10% of the company's assets need be reported. Companies therefore were not disclosing environmental liabilities even if the aggregate liabilities exceeded 10% of the company's assets.

On July 15, 2004 the GAO released a report entitled "Environmental Disclosure—SEC Should Explore Ways to Improve Tracking and Transparency of Information." That report concluded that "little is known about the extent to which companies are disclosing environmental information in their filings with the SEC." The report made three recommendations; (1) the SEC should track the information from its reviews of company filings; (2) the SEC explore the creation of a database of SEC letters commenting on companies' filings and company responses that would be accessible to the public; and (3) that the SEC and EPA improve coordination so that the SEC can take better advantage of EPA data relevant to environmental disclosure.

With the passage of Sarbanes-Oxley, the methods that corporations use to estimate and report environmental liabilities have come under increased scrutiny. Since August 2002 a number of environmental organizations led by the Rose Foundation have petitioned the SEC to adopt the Association for Testing and Materials (ASTM) "Standard Guide for Estimating Monetary Costs and Liabilities for Environmental Matters" (ASTM E 2137) as a regulation. The petition states that "Without clearly articulated methods for estimating costs and liabilities and without full and accurate disclosure, significant underreporting and inaccurate reporting will continue." The ASTM standard would also require reporting companies to aggregate environmental liabilities to determine if they exceed the SEC materiality threshold rather than consider them on an individual basis.

Other organizations such as the Corporate Environmental Enforcement Council (CEEC) have expressed their disagreement with the pending rulemaking petition citing the need for increased enforcement of existing laws rather than a "fundamental overhaul of the environmental disclosure requirements." To date, no action has been taken by the SEC in response to the petition.

where there is more than one interested party (i.e., mergers and acquisitions; insurance contracts), especially where one party or another is accepting a great degree of financial risk associated with the liabilities.

Using this approach a range of potential outcomes can be developed for a property, such as Property E. The total cost for each scenario presented above for Property E is actually the sum of the costs for a number of individual tasks (remedial investigation, remedial design, capital construction, O&M costs, potential NRD claims, etc.). Each individual task can be assigned a range of costs and probabilities. The various costs and probabilities are then evaluated using a Monte Carlo statistical model to develop a probability distribution for the potential environmental costs either for a single property or for a portfolio of properties. The resultant output is a continuous curve of probability versus cost, as shown in Figure 1.

Note that although the single outcome estimate for Property E was $800,000 and the expected value was $930,000, the probability analysis indicates that there is a 20% probability that the cost could exceed these values. The cost may actually approach $1.7 million which is more than double the single outcome estimate.

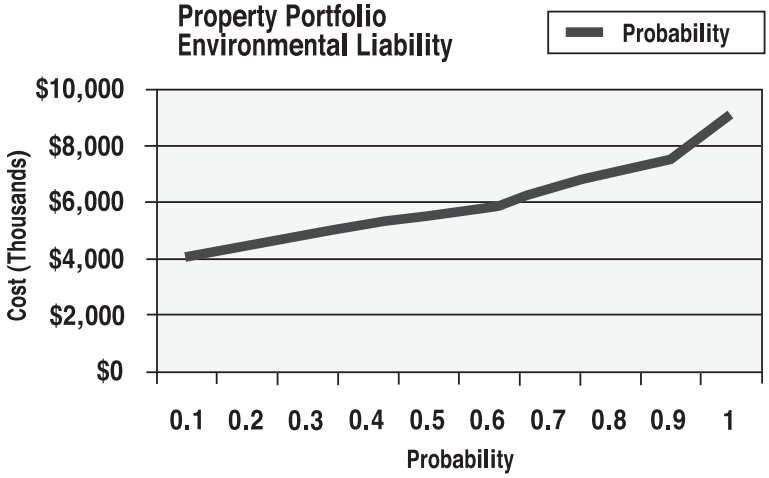
The aggregate cost probability curve for the portfolio of properties A through E is shown in Figure 2.

Note that although the single outcome cost estimate for the portfolio was $5,180,000, the probability analysis indicates there is a 50% probability that the cost will exceed this value and that the cost could approach $9 million.

Using this approach the risk manager can understand the full continuum of costs and risk and can effectively manage based on an evaluation of the cost distribution. For example, in Figure 1 there is an "inflection point" at the 80% probability mark where the slope of the curve increases significantly. This represents a point of significant additional risk. Upon further evaluation, it may be determined that there is a possibility that ground water contamination at this site may extend off-site and there is a risk of third party liabilities. This potential third party liability is the reason for the upward inflection in costs. By collecting additional samples to prove that contaminated ground water is not migrating off-site, it may be possible to eliminate third party impacts as a potential risk factor and smooth out the cost probability curve.

Environmental remediation projects typically take up to 30 years or more to complete. Although beyond the scope of this article, a more detailed analysis of costs and timing can allow the risk manager to project future cash flows for environmental liabilities on a NPV basis, similar to loss development curves they are used to dealing with.

Figure 2 - Estimating Environmental Liabilities



Where to Estimate Environmental Liabilities

Financial statements. Under the current regulatory climate it is acceptable to estimate environmental liabilities using any one of the methods described. Given that there is growing concern about the accuracy of environmental disclosures in financial statements some sort of probability analysis is recommended. The single outcome approach is not recommended since it does not address variability at all. The range of values approach is really not useful in this situation since it only provides a cost range as the final result. In addition, most experienced environmental professionals are capable of assigning probabilities to different scenarios based on professional judgment and experience. Therefore this approach is not typically necessary. Finally, while acceptable under current SEC rules, the known minimum value approach is losing favor as this type of approach is coming under increased scrutiny by those who are concerned about the underreporting of environmental liabilities.

The preferred method for SEC filings would be the expected value approach. The most likely value approach is also acceptable, although it has the same limitations as the single outcome method. Probabilistic models can also be applied if a more in-depth analysis of liabilities and potential variations from expected values is desired.

Sale or purchase of environmentally impaired properties or brownfields. The uncertainty associated with environmental cleanup costs are often a significant stumbling block to the sale, purchase or redevelopment of impaired properties. Typically projected cleanup costs are factored into the purchase price of a property or are set aside in an escrow account to cover cleanup costs. Take the example of Property E above. The seller of the

property may estimate that projected cleanup costs are $400,000 based on a single outcome cost estimate and the potential buyer may estimate the cleanup costs to be closer to $1.5 million. In some situations this difference of opinion may prove to be a deal breaker. This underscores the shortcomings of single outcome cost estimates in this type of situation.

As can be seen in Figure 1, both cost estimates are actually within the realm of possible outcomes, albeit at the fringes of the probability distribution. In this situation a more sophisticated probabilistic evaluation is always better since it could provide the basis for moving ahead with the deal. If both sides agree on a probability distribution such as that shown in Figure 1, the parties might be able to agree on a number somewhere nearer the middle of the probability curve. Or the potential buyer may conduct a Phase II sampling program to resolve certain key risk factors in order to flatten the price curve. The bottom line is that each party can factor the range of costs into their financial analysis of the transaction (e.g., calculate rate of return etc.), to decide what their risk tolerance level may be.

Purchasing environmental insurance. The most common environmental insurance products are Cleanup Cost Cap (CCC) and Pollution Legal Liability (PLL). CCC policies allow companies to limit the costs related to the cleanup of "known" conditions at contaminated sites by providing extra funds to complete a site cleanup in the event of a cost overrun. CCC policies can be written for a single site or to cover aggregate liability over a portfolio of sites and they are often used as a tool to help manage the financial uncertainties associated with environmental liabilities and can be applied in either of the situations discussed above. For example they can be used to cap environmental liability exposures associated with SEC filings or can facilitate property sales by capping sales price adjustments or escrow set-asides. PLL policies transfer the risk of cleanup for unknown pollution conditions at a site. Since unknown costs can not be assigned a probability of occurrence or monetarily quantified, the following example will focus on estimating known costs for CCC policies.

Loss forecasting is central to the role of insurance underwriting. Most insurers use some sort of probabilistic model as described above to develop a probability distribution curve for potential environmental liability costs similar to Figures 1 and 2. An insurer might choose the 70% or 80% probability for the "attachment point" of an insurance policy. This is the cost at which the policy will begin to pay out. As shown in Figure 1 and Figure 2, for an 80% probability, this would be $900,000 for Property E and $7 million for the portfolio of sites. Risk managers can lower policy attachment points and premiums by understanding how the probability models are used and by instructing their EHS staff to collect information that will reduce uncertainty and narrow the range of potential costs associated with environmental liabilities.

One price does not fit all. As shown in the examples provided, "one price does not fit all" when it comes to estimating the cost of environmental liabilities. However, it may be fair to say that one price range does fit all. The risk professional who understands the various cost estimating methods and how they are applied in different situations can help reduce financial uncertainty and risk associated with environmental liabilities for their organizations and can ensure proper disclosure of environmental liabilities on financial statements.

***Edward Sullivan**, P.G., ARM is a senior project manager with The Whitman Companies, Inc., a New Jersey-based environmental consulting firm.*

Setting the Standard in
Environmental Engineering & Management

116 Tices Lane, Unit B-1
East Brunswick, NJ 08816

Tel: (732) 390-5858
Fax: (732) 390-9496

E-mail: esullivan@whitmanco.com
Internet: www.whitmanco.com

Reprinted with permission from Risk Management Magazine, July 2005 issue, pages 24-30.
Copyright 2005 Risk and Insurance Management Society, Inc. All Rights Reserved. *www.rmmag.com*