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SUPERFUND

The Role of Risk in Setting
Priorities

Statement for the Record by
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Mr. Chairman and Members of the Committee:

As the Committee considers the reauthorization of the Superfund program, we are pleased to provide this statement for the record summarizing our completed work on the Environmental Protection Agency's (EPA) use of risk to set priorities in the program.

With the creation of the Superfund program in 1980, the Congress required EPA to determine cleanup priorities for the nation's hazardous waste sites on the basis of the relative risk these sites pose to human health and the environment. To further this goal, in 1989 EPA initiated a "worst sites first" policy. Under this policy, sites that posed the greatest risk were to be placed on the National Priorities List, the list of the country's most contaminated properties. In addition, risk was to be one of the criteria EPA uses to determine which sites already on the list to begin addressing first. Finally, once EPA decides to begin addressing a listed site, it conducts a formal "baseline" risk assessment to help it determine what actions are needed to protect human health and the environment.

Our statement will address two issues: the extent to which EPA (1) has implemented its policy of "worst sites first" to reduce its backlog of sites awaiting screening for the National Priorities List and to prioritize sites already on the list and (2) follows its own guidance in conducting baseline risk assessments.

In summary, we have found the following:

- EPA has not fully implemented its policy of addressing the worst sites first. EPA regions are delegated the responsibility for setting priorities. However, faced with a backlog of thousands of hazardous waste sites to evaluate for potential placement on the National Priorities List, EPA regions have not routinely used risk as a major criterion in deciding which to evaluate first. Nor have they used risk to prioritize the sites already on the list to determine at which sites to begin the cleanup process first. Instead, other factors, such as the length of time a site has been awaiting review, have determined regions' priorities.
- The risk assessments we reviewed for sites already on the list generally followed the agency's guidance but were inconsistent in several ways that could have underestimated or overestimated the potential for people's exposure to contamination. For example, when EPA lacked sufficient data about the risk from a person's touching contaminated soil, some of its risk assessments provided no estimate of that risk, while others attempted

to develop an estimate by using the limited data that were available. Assumptions about the future use of sites also varied among the risk assessments, even though the characteristics of the sites were similar. Whether the sites are used for industrial or residential purposes is a major factor in determining the level of people's exposure to contamination and, consequently, the risk posed by these sites.

Before further discussing these findings, we would like to provide some background on how risk assessment enters into the processes of selecting, evaluating, and cleaning up Superfund sites.

BACKGROUND

The process for determining which sites in EPA's inventory of hazardous waste properties belong on the National Priorities List begins with a series of increasingly detailed investigations to determine the seriousness of the threats. Sites that make it through these initial screening steps are scored using the Hazard Ranking System. Revised in December 1990, this system assesses the relative risk posed by exposure to contamination through four "pathways"--soil, groundwater, surface water, and air. Each site receives a score ranging from 0 to 100, and those that score above a determined threshold (28.50) are considered for placement on the list.

EPA begins work at a listed site by initiating a remedial investigation and feasibility study to determine what the nature and extent of the site's contamination is, whether to undertake a cleanup, and what actions are needed. In addition, EPA considers the relative costs and feasibility of various types of approaches to reducing the risk. Part of this investigation is the baseline risk assessment. This assessment analyzes in detail the toxicity of the chemicals involved and the pathways by which people might be exposed, and calculates the resulting risks of their contracting cancer or other serious diseases.

If EPA determines that cleanup is necessary to protect public health and the environment, the agency implements a plan for addressing the contamination. Under federal regulations for the Superfund program, the cleanup, or remedy, must protect public health so that an individual's lifetime cancer risk is less than 1 in 1 million. Thus, EPA can use the results of the risk assessment to help it determine not only whether to clean up a site, but how extensively a site may need to be cleaned up to protect human health and the environment. However, the risk assessment alone does not determine cleanup decisions. The legislation that created the Superfund program also requires that a remedy comply with "applicable . . . or relevant and

appropriate" requirements (ARAR).¹ These are federal or state standards that, among other things, set limits on environmental contamination for soil, groundwater, surface water, air, or sediments.

POLICY OF ADDRESSING WORST SITES FIRST NOT FULLY IMPLEMENTED

EPA acknowledges that it needs to do a better job of addressing hazardous waste sites that pose the greatest risk to public health and the environment and has adopted a policy of addressing the worst sites first. Although EPA has made considerable progress in reducing the number of sites awaiting scoring under the Hazard Ranking System, as of March 1995 about 2,500 sites had still not been scored. The large number of unscored sites makes it imperative that EPA continue to emphasize its policy of worst sites first.

Last year, we reported that EPA regions did not always use risk as a criterion in deciding which sites to score first for possible inclusion in the National Priorities List.² Only two regions that appeared to prioritize their sites at all did so not according to risk but according to other factors.³ For example, according to EPA officials, Region 5, which had the largest backlog of sites (over 1,400) that needed to be evaluated for the National Priorities List, traditionally assessed first those sites that had been awaiting review the longest or those sites for which they had collected the most complete data. However, the region is now trying to rank sites on the basis of their potential human health and ecological risks, with top priority given to those that pose a direct threat to groundwater or contain contaminated soil.

Our work and that of the Center for Technology, Policy and Industrial Development at the Massachusetts Institute of Technology (MIT) have shown that EPA regions also have not used risk as a criterion in deciding where to begin remedial investigations once sites are on the National Priorities List. According to the MIT study, EPA subjected all sites on the National Priorities List to the same evaluation steps, giving

¹Section 121(d)(2)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) specifies that remedial actions under the Superfund program must meet ARARs.

²Relative Risk in Superfund (GAO/RCED-94-233R, June 17, 1994) and Superfund: Reauthorization and Prioritization Issues (GAO/T-RCED-94-250, June 24, 1994).

³See Program Enhancements Would Accelerate Superfund Site Assessment and Cleanup, EPA, Office of Inspector General (Washington, D.C.: Jan. 31, 1994).

inadequate attention to prioritizing according to site-specific issues such as risk, cost, and available technology.⁴ We found, for example, that Region 5's strategy was to fund equal numbers of sites in each state and generally confer with states to determine where to allocate their resources first for remedial investigations. Region 5 officials added that a community's concerns could also influence where they initiate work.

The Hazard Ranking System could help regions prioritize sites on the National Priorities List by risk. Because the extent and quality of data vary from site to site, Hazard Ranking System scores are not ideal, but EPA officials acknowledge, and we agree, that they could be used to at least broadly rank sites on the list into categories of relative risk. However, EPA currently uses the Hazard Ranking System only to decide which sites are contaminated enough to belong on the list. To conserve resources and save time, regions may assess only one or two pathways, stopping the assessment of the site once the score reaches the threshold score of 28.50 for the list, even though the maximum potential score for inclusion on the list is 100. Consequently, scores usually do not reflect the relative severity of sites' risks, which regions would need to categorize sites.

RISK ASSESSMENTS GENERALLY IN LINE WITH GUIDANCE,
BUT INCONSISTENT IN A FEW IMPORTANT WAYS

In recent years, public attention has focused on EPA's methodology for quantifying the threats from hazardous waste. Industry, in particular, has criticized the methodology for yielding "exaggerated" risk. As we testified in September 1993, because of the uncertainties in measuring human exposure to toxic chemicals and the consequent risk, EPA has made a conscious policy decision to err on the side of caution and, if necessary, overestimate, rather than underestimate the dangers.⁵

In a 1994 review that examined a sample of risk assessments from each of EPA's 10 regions, we found that the assessments generally conformed with the agency's guidance, particularly in how they estimated human exposure to contamination and calculated the resulting risk. However, we found that the risk assessments

⁴Breaking the Backlog: Improving Superfund Priority Setting, Center for Technology, Policy and Industrial Development, Massachusetts Institute of Technology (Cambridge, Mass.: Feb. 1992). This study was done under a subcontract from Arthur D. Little, Inc.

⁵Superfund: Risk Assessment Process and Issues (GAO/T-RCED-93-74, Sept. 30, 1993).

were inconsistent in a few key technical respects.⁶

For example, several of the risk assessments, contrary to EPA's guidance, did not use the average chemical concentrations at the site to calculate the potential exposure to contamination. They used instead higher, or even the highest, levels found at the site--levels that, by EPA's standards, could overstate people's exposure and, consequently, the site's risk. Other risk assessments we reviewed possibly understated people's exposure by leaving out calculations of the risk to people who might come into contact with, or touch, contaminated soil. Some risk assessors did not include these estimates because data were lacking on such things as how much contamination might be absorbed through the skin. Yet other risk assessors calculated dermal exposure by substituting the known absorption rates for similar contaminants.

EPA's guidance, we found, permits such inconsistency even though it may lead to uneven estimates of risk. EPA acknowledges that risk assessment is not an exact science and that data are often lacking or inconclusive to conduct a number of the steps in the assessment process. As a result, EPA grants risk assessors a great deal of latitude to exercise their professional judgment when developing risk assessments.

However, we found that many of the risk assessments in our study did not properly qualify their results by fully disclosing such things as the assumptions used and the effects these might have on the calculations of risks. EPA officials noted that the agency's guidance calls for risk assessors to clearly communicate assumptions and their impacts, but the officials acknowledged that they could do a better job of ensuring such communication.

We also found that risk assessments varied in the way they estimated how Superfund sites would be used in the future. EPA requires risk assessors to determine a site's future use, for example, as residential, industrial, or recreational property. The future use of the land can significantly affect how people will be exposed to contamination, how much they will face, and, hence, the potential for risk. The greatest risk is posed by sites projected for future residential use, where homes are to be located and people would be subjected to contaminants frequently through a variety of activities and over long periods of time. In line with EPA's policy of conservatism, the agency's guidance encourages risk assessors to assume residential use when a site's future use is in doubt. However, because EPA does not require this, we found that assumptions about land use varied, even for

⁶Superfund: Improved Reviews and Guidance Could Reduce Inconsistencies in Risk Assessments (GAO/RCED-94-220, Aug. 10, 1994).

sites with similar characteristics. In our review of risk assessments for three similar sites--landfills with nearby homes and contaminated groundwater--we found that the risk assessors projected that one site would remain an abandoned landfill but that the two others would be used for residential development. As a result, the landfills were given different assessments of risk.

CONCLUSIONS

In conclusion, Mr. Chairman, we believe that knowledge of the relative risk of individual sites is important not only when deciding whether and how extensively to clean up a site, but throughout the Superfund process. In establishing its worst sites first policy, EPA has embraced this philosophy. However, as we have noted and EPA has acknowledged, it needs to do a better job of implementing the policy by emphasizing risk when determining which sites qualify for the National Priorities List and which sites on the list to address first. We find it encouraging that EPA is taking action to use risk to help decide which sites to evaluate first for the list and that the agency agrees that an existing tool--the Hazard Ranking System--could be more effectively used to rank sites already on the list for cleanup according to their relative risk.

But risk assessments are not without their problems. The scientific data on which risk assessments rely are often incomplete, and the data that are available include uncertainties. Inadequacies in the data make subjective judgments unavoidable to determine which sites should be cleaned up and to what level of protection. We and EPA believe, however, that for all the problems in quantifying risk, risk assessments, along with analysis of the cost and feasibility of reducing the risk, are still a useful framework for ensuring that scarce resources are rationally allocated in this multibillion-dollar program.

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