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Evaluation of the Superfund Policy

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An Evaluation of the Superfund Policy

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In 1980 the Comprehensive Environmental Response, Compensation and Liability Act, otherwise known as Superfund, was created to combat hazardous waste sites. In order to ease citizen concern, the cleanup plans of Superfund were designed to focus not only on environmental contamination, but also on public health. Studies conducted by the Office of Emergency Remedial Response have shown that pollution has detrimental effects on health, such as cancer. Though beneficial, these cleanups do not come at an insignificant cost. Furthermore, the cleanup sites are not reviewed under the benefit-cost analysis. One major concern with the Superfund program is that the costs to cleanup some of the sites may outweigh the benefits of the cleanup. By reviewing a cost-benefit analysis already conducted, we have been led to believe that the benefits of these cleanups are not economically vindicated.

Since the nineteenth century, hazardous waste sites have been accumulating across the nation. These sites have been contaminated by hazardous materials resulting from economic activities such as mining, petroleum refining, manufacturing, and waste disposal to name a few. In many cases, the firms responsible have not taken the steps necessary to cleanup the sites. As a result, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act, otherwise known as Superfund, in 1980 to locate, investigate, and clean up these contaminated sites across the country. In 1986 more stringent guidelines were set forth under the Superfund Amendment and Reauthorization Act to further target health and environmental risks posed by the hazardous sites (http://www.epa.gov/superfund/). Although it may seem extremely advantageous, there is one quandary with Superfund – its excessive cost. The plans for cleanup, administered by the Environmental Protection Agency (EPA), are costly, and furthermore, the plans do not undergo any form of cost-benefit analysis. Without any form of a benefit-cost analysis, the costs of cleanup may potentially outweigh the benefits. By reviewing an analysis conducted by James T. Hamilton and W. Kip Viscusi and a study by Brian H. Hurd, we are able to get a closer look at the benefits and the costs of Superfund cleanup sites. By evaluating the Superfund sites, we can inevitably determine how cost effective the Superfund's plans actually are.

The primary purpose of the Superfund program is to de-contaminate sites that pose risks to the environment, but it is not as straightforward as it may seem. According to the EPA's official Superfund website, the process begins with the identification of

hazardous sites. After sites are recognized, they must be put through the Hazardous Ranking System, which ultimately determines what sites must be placed on the National Priorities List. The NPL consists of hazardous sites that are deemed most threatening to the environment and or human health. The sites on the NPL are the ones that are eligible for federal funds; in other words, the government funds the cleanup of these sites. Currently there are approximately 1300 sites on the National Priorities List. After evaluating the degree of contamination for each site on the NPL, the EPA then contemplates possible approaches for cleanup (http://www.epa.gov/superfund/). To help finance these cleanup plans, federal taxes have been created. These taxes create reserves for the EPA that are used to finance cleanups that pose immediate risks (emergency cleanups), and long-term cleanups that have "no responsible parties" (Portney and Probst 106).

In addition to identifying the sites that are most hazardous to the environment, the EPA must also attempt to determine the firms responsible for contamination. This is not an easy task, and according to the article "Cleaning Up Superfund," many of the sites have more than one firm that can be held accountable for pollution (109). Regardless, this duty is vital in determining a way for costs to be allocated.

The enactment of Superfund has resulted in many beneficial results. One of the most obvious results is an unpolluted environment, which produces a plethora of effects, most importantly, the preservation of human health. Cancer is one of the most detrimental repercussions of a contaminated environment, and due to the Superfund program, many cancer cases have been avoided.

Another benefit from Superfund is the improved management of hazardous substances. Firms do not want to be held accountable for the damages caused by pollution; hence they try to limit the use of substances that could serve as a potential threat to the environment. Moreover, firms on the National Priorities List may face a decrease in stock prices due to the public's discontent. This is an indirect means of payment, which will put more pressure on the firms to be environmentally conscious.

All of these benefits may seem like enough incentive to cleanup every site on the National Priorities List: however, it is not that simple. There is a great deal of controversy surrounding the Superfund program, and one of the major issues that continues to arise is its cost.

According to Paul Portney and Katherine Probst, one of the major concerns with Superfund is its growing cost. Although small in comparison with the total annual expenditures on environmental laws ($6 billion as opposed to $130 billion), Superfund's annual costs are bound to increase. Portney and Probst point out the fact that "if [the] EPA continues to add sites to the NPL at the current rate of fifty per year for the next decade, total expenditures will increase by fifteen billion dollars. These are sums worthy of serious attention" (107).

Another commonly debated problem with Superfund is the allocation of cleanup costs. "Under Superfund, liability is referred to as retroactive, strict, and joint-and-several" (Portney and Probst 107). Retroactive refers to "activities that took place before Superfund was enacted. Strict liability is that which is unrelated to the care of the negligence responsible parties may have exhibited in the past" (107). Joint-and-several liability is probably the most controversial of them all because it "implies that any one

party at a site can be required by the government to pay for the entire cleanup, regardless of the share of wastes it contributed" (107). All of these liability requirements cause many firms to find the Superfund program objectionable, but there is still one more apprehension that irks many about Superfund.

The possibility that the EPA may overestimate the health and environmental risks that develop from hazardous sites is a more pressing concern that Portney and Probst mention in their article. An exaggeration of risks implies an exaggeration of costs. This is an issue worth pursuing because if a contaminated site is only trivially threatening, it may be far more economical to ignore that site altogether. However, in order to decide whether or not a cleanup is vindicated, a cost benefit analysis must be conducted.

A cost-benefit analysis is a technique designed to determine the feasibility of a project or plan by qualifying its costs and benefits. By assessing the cost effectiveness of Superfund cleanup sites we can ultimately determine whether or not the benefits outweigh the costs. It is considered to be ineffective policy on occasions in which the costs overcompensate the benefits for a cleanup.

When conducting any cost benefit analysis, it is essential that all aspects of the project be expressed in terms of a common unit. When money is used as the common unit, all benefits and costs of the policy will be measured in terms of the equivalent money value. One must note that although benefits may not produce an actual profit, the benefiting society will place a monetary value on the benefits of the policy. When analyzing the Superfund policy, we must look at the value placed on the benefits of saving a human life. However, determining the value of a human life is a controversial subject - one that has brought about considerable public opposition for placing a

monetary value on a human life. One must understand that Superfund projects are intended to reduce the risk of death caused by pollution from hazardous materials. Other than reducing the risk of death to society, Superfund policies put economic pressure on potentially responsible firms' capital (Freeman 141).

In the article "How Costly Is "Clean"? An Analysis of the Benefits and Costs of Superfund Site Remediations" by James T. Hamilton and W. Kip Viscusi, a sample of 150 superfund sites was used as a basis for our analysis. In their research, they used chemical samples from each site and used a consistent method to find the risks posed to the local population. "Cleanup goals that protected human health were identified for... carcinogens as concentration levels that 'represent an excess upper bound lifetime cancer risk to an individual to between 10^-4 and 10^-6 lifetime excess cancer risk'" (Hamilton and Viscusi 4). The discretionary zone for lifetime excess cancer risk is the interval between 10^-4 and 10^-6. Risks levels greater than or equal to 10^-4 require immediate cleanup. The following chart is a distribution of sites by maximum cumulative risk.

Table 1. Distribution of sites by maximum cumulative risk.

	Carcinogenic risk level					
Risk scenario	10^{-4} to 1	10^{-4} to 10^{-6}	Below 10^{-6}	Total sites[a]	Mean risk	Median risk
All	130	20	0	150	7.0E–02	2.5E–03
On-site	94	12	0	106	6.5E–02	3.8E–03
Off-site	41	8	0	49	7.7E–02	1.0E–03
Current	16	3	0	19	1.7E–02	5.1E–04
Future	114	19	0	133	7.6E–02	2.6E–03
F.O. res.	81	11	0	92	7.4E–02	4.0E–03
Not F.O. res.	53	9	0	62	6.3E–02	1.1E–03
Soil	18	11	0	29	5.3E–02	6.0E–04
Groundwater	112	9	0	121	7.2E–02	2.6E–03

Note: F.O. res.=Future on-site resident.
[a]Total number of sites in categories does not sum to 150 because at some sites multiple populations are exposed to the same cumulative risk level.

(Hamilton and Viscusi 6)

Once the risks to the population were determined, they were then compared with contaminated site information, contaminated water maps and the 1990 census report. From this comparison, they were able to ascertain the expected cancer cases from these contaminated sites over a thirty-year period. By using a new strategy consisting of information on capital, operation and maintenance costs for various cleanup plans for over two hundred sites, a guideline was constructed for future use. The last device used for risk assessment of superfund was the process of combining the cost of cleanups with the expected number of cancer cases in order to determine the cost per cancer case avoided.

In order to determine the cost effectiveness of the superfund cleanup policies, estimates of cleanup costs were established. For this analysis, we consider the benefits to be cancer cases avoided. According to Hamilton and Viscusi, the average cost of cleanup for Superfund sites was $18.1 million (Hamilton and Viscusi 13). This cost is the projected, or estimated, cost of the cleanup plan, but once a site's cleanup is underway, the costs are likely to escalate. Once completed, the average cleanup site cost is approximately $25.7 million (14).

Each hazardous site surveyed by the EPA under the Superfund policy requires cleanup of soil, groundwater, and operations and maintenance. Soil cleanup is the largest recipient of the Superfund costs, which takes up over 91 percent of capital costs - an average of $17.3 million (14). Groundwater is second with a financial funding average of approximately $13.1 million (14). However, these numbers vary dramatically between the levels of importance by each site. For example, sites that are deemed more perilous to society obtain more funding: "The top 20 percent of sites in terms of costs accounted

for 47 percent of all estimated grown expenditures. while the bottom 40 percent of sites totaled on 14 percent of these remediation costs" (14). By calculating the level of risk. the EPA can determine which sites have a vital need for cleanup. The higher the level of risk. the higher the level of urgency placed on the site for cleanup in order to reduce potential cancer cases.

For our study. we will use the cost per cancer cases avoided at Superfund sites in order to determine the cost effectiveness of the sites' cleanup. The following graph shows the number of cancer cases expected from each site studied by Hamilton and Viscusi

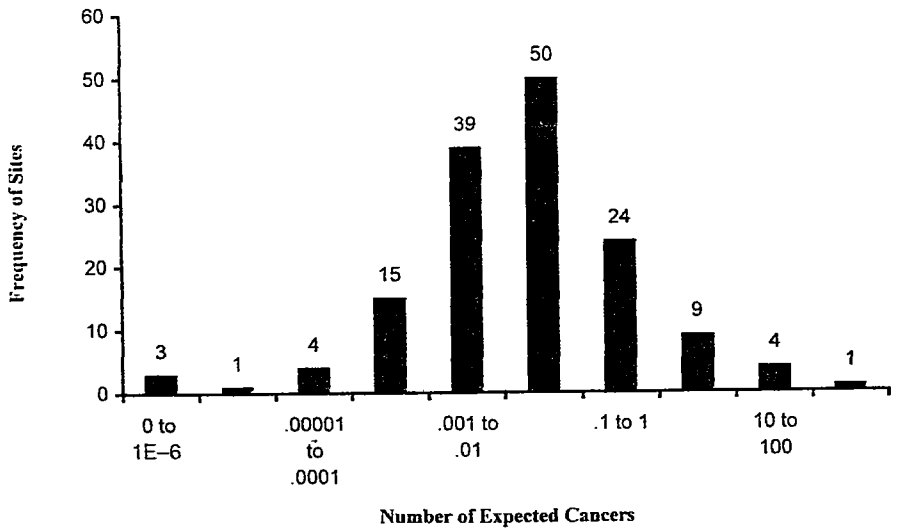

Figure 1. Number of cancers expected from site contamination (Hamilton and Viscusi 12)

In concordance with Hamilton and Viscusi's research. we must assume that all cancer cases are fatal and each site will address the estimated number of cancer cases that could potentially arise over a thirty-year period (5). We must also take into account that all Superfund sites are different. thus they require different levels of prevention and cleanup. Of the reviewed 150 cleanup sites. "$2.2 billion dollars (1993) in current and planned remediation actions are slated to be expended to avert 731 cancer cases. which yields a

mean cost per cancer case averted of $3 million for remediation actions at the sites" (Hamilton and Viscusi 18). These figures presented by Hamilton and Viscusi show that the Superfund policy and its cleanup plans are, in fact, cost effective. However, the EPA analyzes the risks and costs from only small sections of theses sites, which means that these estimates presented by the EPA are not entirely accurate.

Since the results reflect merely an average cost of cancer cases avoided, the individual cost of a single cancer case avoided can range anywhere from $20,000 up to, and beyond, one billion dollars. In fact, "Costs per cancer case averted are very high at most of the Superfund sites in the sample, with only 44 out of the 145 sites having a cost of cancer cases averted less than $100 million" (Hamilton and Viscusi 22). The following graph shows the total cost per cancer case avoided for all of the 145 sites studied

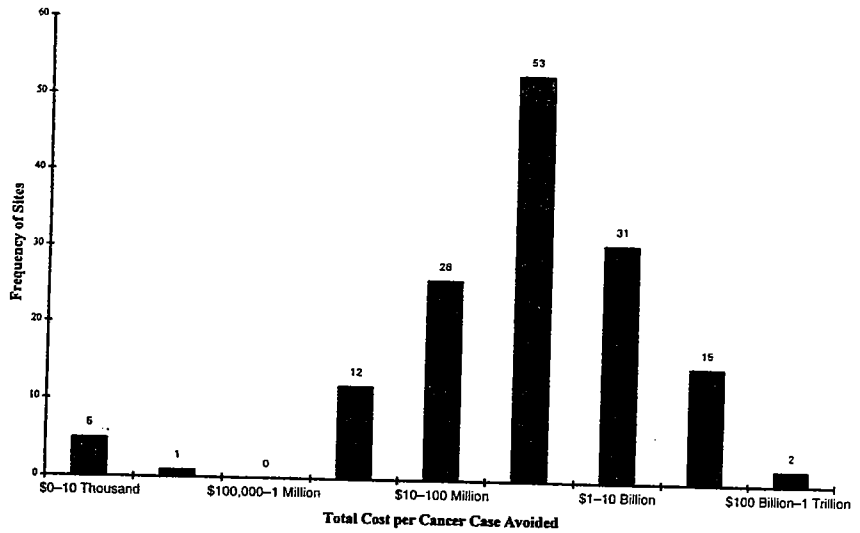

Figure 2. Total cost per cancer case avoided (1993$, no cost growth).
(Hamilton and Viscusi 19)

During their study, Hamilton and Viscusi determined that the average cost of one cancer case averted is approximately $3.5 million. However, this cost is not completely accurate, because, as previously mentioned, several of the tested sites are small, and the

cost per case avoided is low. Also, according to the article "Environmental Policy Since Earth Day I: What Have We Gained?" almost seventy percent of the Superfund sites have estimated costs per cancer case avoided over $112 million, which suggests that "the majority of the remediation plans are not economically justified, at least not at their present scope and degree of cleanup" (141).

The second investigation that we have used for the cost benefit analysis is the effect on real estate markets close to these hazardous sites. Any casual observer can note that the demand for real estate near hazardous waste sites is minimal due to the potential risks to human health. In his article "Valuing Superfund Site Cleanup: Evidence of Recovering Stigmatized Property Values," Brian H, Hurd states that "property near hazardous waste sites can recover value through time because of changes in buyer perceptions" (Hurd 435). In other words, buyers' perceptions of the area will change, and it may take several years before society is comfortable with the area again. Hurd also states that property values have recovered more than eighty percent of their initial losses due to being in close proximity to hazardous waste sites. Thus, from a real estate perspective, the benefits of cleaning up a Superfund site do offset the costs, in the long run.

The EPA takes action at hazardous waste sites not only to protect human health, but the environment as well. However, the price of these projects is extremely high – so high that they cannot go unnoticed. Economically speaking, the most cost effective way of dealing with the hazardous sites is to avoid it all together, but that solution is obviously not at all feasible. The EPA should conduct a fully comprehensible cost benefit analysis for every Superfund site before cleanup plans are contemplated. In order to determine

what sites' cleanup is economically vindicated. the EPA must consider the actual price of cleanup - not just the estimate. These sites need to become cost effective in order to prove their success. In addition to the cost benefit analysis. the EPA must conduct a risk assessment. The EPA encourages conservative risk estimates. which creates misrepresentations of actual levels of risk. Once the EPA adopts these two methods. economically. the Superfund policy will be much more effective.

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