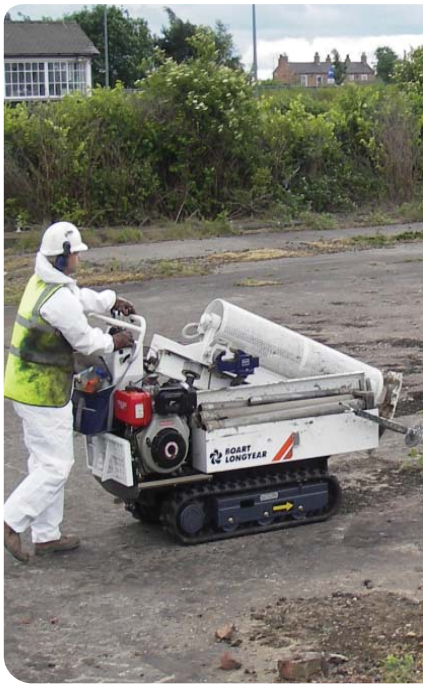
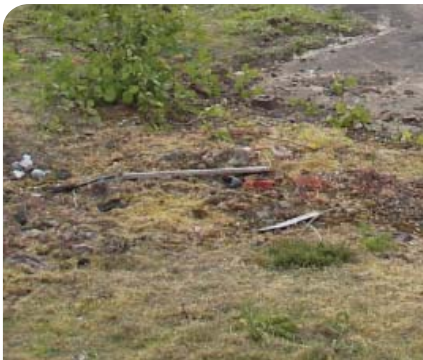
How Clean is Clean

Guidebook – P066





Center for Health, Environment & Justice
P.O. Box 6806, Falls Church, VA 22040-6806
703-237-2249 chej@chej.org www.chej.org

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P.O. Box 6806 • Falls Church, VA 22040 • Phone: 703.237.2249 • Fax: 703.237.8389 • www.chej.org

Mentoring a Movement

Empowering People

Preventing Harm

About the Center for Health, Environment & Justice

CHEJ mentors the movement to build healthier communities by empowering people to prevent the harm caused by chemical and toxic threats. We accomplish our work by connecting local community groups to national initiatives and corporate campaigns. CHEJ works with communities to empower groups by providing the tools, strategic vision, and encouragement they need to advocate for human health and the prevention of harm.

Following her successful effort to prevent further harm for families living in contaminated Love Canal, Lois Gibbs founded CHEJ in 1981 to continue the journey. To date, CHEJ has assisted over 10,000 groups nationwide. Details on CHEJ's efforts to help families and communities prevent harm can be found on www.chej.org.

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Chapter 1

How Clean is Clean?

On September 21, 1985, CHEJ convened a meeting in Arlington, Virginia to discuss the issue of "How Clean Is Clean?" or how much cleanup is enough at toxic waste sites. The meeting was called because of the confusion, controversy and difficulty in deciding amongst various interest groups just how to determine an acceptable cleanup level.

Although the meeting occurred some time ago, the issues and approaches to defining how clean is clean discussed in this guidebook are still relevant today. Government still relies on the same risk-based approach that is addressed in this guidebook.

How clean is clean is another way of saying how do you establish a cleanup goal and what should that goal be. As government and industry clean up waste sites, it is important to establish a goal, which tells you when the cleanup is complete. Ideally, once the cleanup goal is achieved, no further cleanup should be needed and the community should not be in any further risk of exposure or contamination from the site. Establishing a cleanup goal will influence the extent of cleanup required and the technology selected to achieve the goal.

This issue is critical to deciding when a dangerous waste site has been sufficiently cleaned up, so as to be considered "safe" and posing little or no risk to the community. EPA struggled with this issue until it developed risk-based "preliminary cleanup goals (PRGs) on a regional basis. Region 3 and Region 9 have established the most accepted and used values. These PRGs are used as guidelines only and are not legally enforceable cleanup goals. No federal level standards or guidelines exist.

Policy makers, bureaucrats, environmentalists, industry and other responsible parties are all affected by the decision made on cleanup levels. But these most affected are the people living near or next to a leaking site. These people must live with whatever residual copntamination remains and the uncertainties of the technologies used for cleanup.

Community leaders from 16 states attended the meeting along with representatives of environmental organizations, lobbyists and policy makers. Three approaches for achieving a cleanup goal were described: cleanup to zero; to existing standards (also called baseline); and to background levels. The advantages and disadvantages of each were listed, and their impact on local communities discussed.

This paper provides a summary of that meeting and the issues discussed. It reflects concerns raised by participants and provides a basis for further discussion. Additional comments and suggestions on how to address this difficult issue are welcomed.

Chapter 2

Summary of Meeting

Three approaches to setting cleanup goals were presented, as were locations for applying the cleanup goal (point of measurement). This discussion raised many questions, and much confusion and controversy. Everyone agreed that no one approach alone provided a clear resolution. Some argued that background was not "winnable", that EPA and industry would never accept this as the cleanup goal. Others argued that zero was unrealistic, unobtainable and only applicable in a perfect world which doesn't exist. Still others felt that a standard was as far as EPA and industry would go in establishing a cleanup goal.

After much discussion and debate, the participants developed an approach they felt best reflects their position on this issue: they wanted a goal of zero residual contamination or complete cleanup. However, they realized this might not be achievable at the current time. Thus, they proposed that the cleanup goal be as low as possible (presumably this is background). And only for those situations where background was high or unreasonable would the baseline or standards approach be appropriate. The participants felt strongly that using standards resulted in setting a legal limit to pollute a community (up to the standard). Once a standard is set, you must live with that level of contamination forever. This is unconscionable and is the major stumbling block to the standards approach.

Regardless of the goal setting approach, the participants recognized the importance of where the standard is applied (referred to as the point of measurement) and felt that the two cannot be considered separately. They are undeniable connected; the consensus being, the further the point of measurement is from the center of the site, the lower the cleanup goal had to be at the point of measurement. Conversely, people felt they could live with a higher cleanup goal if it was measured at the center of the site.

Mostly importantly, participants clearly expressed they need to be involved in any decision to select a cleanup goal. They wanted a choice over what they're willing to accept, rather than be told, "This is it." So long as people were active participants in the decision, they felt they could live with the result, even if it wasn't the best possible solution.

Chapter 3

The Approaches

To illustrate how each of the 3 options would work, the group arbitrarily selected two points of measurement locations. 1) Some distance from the center of the site (point of measurement is discussed in more detail in the next section) and 2) at the property line. The point of measurement is where you apply the cleanup goal. It could be the first house closest to the site, 500 feet from center or some other location. Two things happen when you apply the cleanup goal away from the site. First, you establish two cleanup goals (one onsite and one offsite), and second, you now need a way to predict how much contamination will move from the center of the site to the point of measurement. Both these factors come into play regardless of which cleanup goal is used.

The first of the two cleanup goals applies to all areas outside the site. In this area any contamination up to the cleanup goal (community exposure standards, background or zero) can exist without requiring any action. The second cleanup level applies to all areas inside the point of measurement (closer to the site). In these areas, cleanup is required only to ensure that the cleanup goal is not exceeded at the point of measurement. In order to achieve this, you need to know how much of the contamination will move from the center of the site to the point of measurement. This would be done using mathematical fate and transport models. Depending on what the model predicts, chemical contamination on-site may have to be reduced, or perhaps nothing needs to be removed if industry can show that the cleanup goal will not be exceeded at the point of measurement. Applying the cleanup goal at any distance from the site provides an incentive for industry to use containment technologis, since the objective is to meet the cleanup goal at the point of measurement. Furthermore, the company may not have to clean up the contamination that exists in the soil or groundwater. In this way, industry has no incentive to use more permanent cleanup technologies.

Standards Or Baseline

The standards or baseline approach would establish a cleanup goal using standards that pose a “safe” or “acceptable” risk to the community. These community exposure standards could be federal drinking water standards or possibly EPA water quality criteria. For

chemicals without existing standards, new standards would have to be established, or a risk assessment would have to be done.

To illustrate this approach assume a standard for benzene of 10 parts per million (ppm) to be achieved at the property line (point of measurement). Benzene is known to cause cancer and other diseases in people. It is mobile in groundwater and easily evaporates into the air.

According to the standards approach, benzene levels less than 10 ppm could exist anywhere regardless of the source. Thus, only those areas with more than 10 ppm benzene world require cleanup. Outside the property line, levels would have to be reduced to 10 ppm while areas inside would have to be cleaned up so that no greater than 10 ppm benzene could remain on-site so long as 10 ppm, was not exceeded at the property line. As long as the point of measurement is not the center of the site, this approach would likely result in significant amounts of chemicals legally being allowed to remain on sites.

In practical sense, groundwater, air and soil could contain up to 10 ppm benzene, since this is defended as an "acceptable" exposure level. Thus, local residents could be exposed to 10 ppm benzene 24 hours a day, 7 days a week, 52 weeks per year for a lifetime

A number of advantages and disadvantages to this approach were identified.

Advantages:

- Provide a uniform cleanup model, giving industry and government an easy system to determine the extent of cleanup at sites.
- Gives a straight-forward approach for cleanup that allows industry to cleanup without involving others (this is the way it's done).
- Establishes a uniform set of community exposure standards.
- Is the cheapest method presently being discussed.
- Provides predictability for all parties, industry, government and the public by establishing set cleanup levels; avoids moving targets (changing standards from site).

Disadvantages:

- Establishes "acceptable" levels of chemicals that will legally be allowed to remain in the community as well as on-site. This may pose future health and environmental problems. This also allows pollution up to a certain level before any action will be taken.
- Establishes two cleanup levels: one beyond the point of measurement and one inside the point of measurement.
- Uses standards (or risk assessment if no standards exist) and transport models to establish cleanup levels. Each of these measures is highly technical, requiring specialized training and experience, and can be easily manipulated to give answers that differ by a factor of 1000. People are essentially excluded from evaluating these processes unless they have lots of money to hire consultants.
- Standards setting process occurs in Washington, D.C., far removed from people affected by deci sions. This limits or excludes most people from participating, except indirectly and thus public support may not be limited.
- It seeks to establish a simplified "model" for determining cleanup levels using standards (risks assessment) and transport modeling, thus eliminating good scientific judgment. Further, there are many uncertainties and widespread inexperience with each of these processes.
- Encourages containment as a remedial alternative by only requiring industry to meet the cleanup standard at the property line. There is no incentive for industry to permanently cleanup sites when they can be "in compliance with the law" by using relatively cheap containment methods.

- Too much depends on monitoring to assure that fate and transport models are accurate
- There are many uncertainties about how chemicals move through soil (fate and transport modeling), where the contamination is, how they got there, how and in what direction they are moving and other factors that influence their movement. The impact of these factors are often determined by uncertain assumptions.
- The uncertainties of risk assessment: assessments are too easily influenced by who does them and the assumptions they make; it's unclear and questionable whether the estimated risks are, in fact, meaningful outside or a research setting.
- There are too few existing health-base standards, and it will take years to develop new ones. Research may reveal new dangers about chemicals that were once believed harmless and later turn out to be toxic. In addition existing health standards have been highly criticized as being set too high to protect the public's health.
- Water Quality Criteria, suggested as possible "standards", exist for approximately 100 chemicals. These criteria are not standards in that they are not enforceable by law. Before industry or EPA adopts these as cleanup standards, there would be hearings, public comment and scientific review of the numbers. All indications are that industry and EPA would not accept these numbers as they stand. The numbers would likely be raised if adopted at all. In any case, these criteria are not ready for use as is.
- Standards do not set "safe" exposure levels, but rather "acceptable" risk levels that do not address chronic long-term exposures, cumulative and synergistic effects and impacts on sensitive popu lations. Low-level long-term exposures pose a risk no matter what standard is set. There is no "safe" level of exposure to carcinogens and there is no way to estimate what increased risk will result from exposure to several compounds together.
- People in a particular community may be forced to accept standards or levels in their environment, which are higher than they are willing to voluntarily accept. In rural areas, for example, where people moved to get away from pollution, the levels could be higher than their background environment.
- No experience with this approach.

Cleanup the Site to a Level of Zero

The second cleanup approach is very simple; clean up the site to the point where no chemicals can be found at all – clean it up to zero.

Advantages:

- A totally clean environment; nothing left to monitor.
- The community does not have to accept any additional risks from chemical exposure.

Disadvantages:

- May not be achievable; many clays and other soils have heavy metals such as arsenic naturally occurring in the environment.
- You can really only clean up to the level of detection of the analytical equipment rather than zero.
- It would make this cleaner than before industry polluted, thus is unfair to industry (industry argument).
- Could make the site unnecessarily clean if there actually are "safe" levels of exposure to carcino gens.
- Highly expensive.

Cleanup to Background Levels

The background approach requires reducing contamination to levels that are comparable to a similar or "control" area that is not affected by

a toxic waste pollution problem. The background approach is a practical method, which can be implemented immediately, while involving the public in the process. In particular, this approach is applicable to sites where a predominant source of contamination can be identified.

The background approach might work as follows:

- **Select a control or comparison area.** The first step would be to identify an area(s) that is not impacted by the site or another waste disposal area. This area would be used to establish typical or background levels of contaminants that would exist had the site not been there. A variation would be to select a nearby census tack, which is outside the impacted area. The control site must be selected by a committee that includes community representatives.
- **Develop a sampling plan**. Once a control area has been identified, a statistically valid sampling program needs to be established to collect samples from the air and soil and from ground water and surface water.
- **Review data on control area**. Once the background levels are established, the numbers would be reviewed. If there is any question about the control levels being too high, then a risk assessment could be done to determine actual risks or standards or other methods could be used. This process might result in the selection of a new control area. If no questions are raised about risks in the control area, then the impacted area would be cleaned up to the contaminant levels found in the control area.

Using the previous diagram and example, assume a background level for benzene of 100 parts per trillion (ppt) [note that this number is 100,000 times lower than the standard of 10 ppm]. This then is the cleanup goal to be achieved at the property line. In this case, areas with more than 100 ppt (rather than 10 ppm) would require cleaned up and levels on-site would have to be cleaned up so that no more than 100 ppt would occur at the property line. Clearly the cleanup goal is much lower for this approach. In the worst case when all background levels are greater than the standard, then the standard would be used. In this way, using the background approach would result in a cleanup goal that could range anywhere from a low of zero to a high of whatever the standard is. This approach has been used in several specific cases across the country, at Manchester Lake in Fairfax County, VA, at Love Canal in Niagara Falls, and in the nationwide dioxin studies.

Advantages:

- It is cheaper than cleaning up to zero (but more expensive than using baseline/standards), thus making responsible parties pay for their pollution and giving them a financial incentive to better manage their waste.
- It can be applied today; you don't have to wait for new standards.
- It is relatively simple, people can understand it, and thus can actively participate in the selection process.
- Provides cleanup of some, if not all, chemicals found at the site, even those for which there are no standards.
- People living in a rural community will not be forced to accept standards or levels in their environment which are higher than the levels of their rural background environment which would occur if community exposure standards are used (they moved from the city to get away from pollution).
- Restores vital resources.
- Would prevent future cleanups as would result if a chemical which was left behind using the base line approach was later found to be toxic. This would also reduce health risks posed by residual chemicals which were initially thought to be nontoxic.

- Removes contamination and thus risks from the community.
- Avoids extensive use of risk assessments and transport modeling.
- Members of the community may be more will ing to support if they are involved as equals in the process.

Disadvantages:

- According to industry and government, this approach may be too expensive.
- May protect people beyond the level of public health standards and thus is overly protective (industry argument).
- May be difficult to determine.
- May lead to identification of other problems in the community, thus requiring additional testing and cleanup.
- No standards to hold local governments accountable to. Without a number, it's hard to get government to move.
- May not be protective enough in areas of high contamination, such as in urban industrialized areas. In these situations, risk assessments or standards should be used.
- Not based on health data, thus may select a level that poses an unacceptable risk to the community (if so, revaluate and select another site).

Some have argued that this approach is more expensive than the standards approach and therefore will not be acceptable to industry and government. While the upfront costs may be higher, long-term costs such as lost property values, operation and maintenance costs and future cleanup costs are mitigated by responsible parties through legal action. In doing this, industry will fully pay for their damages. Cleanup to background levels would provide an incentive to use proper disposal methods and avoid expensive consequences.

While industry officials may claim that these costs will bankrupt their companies, a payment schedule modeled after the IRS approach of collecting back taxes could be developed. Furthermore, the industry is responsible for the situation and should bear the cleanup costs.

Another argument has been made that making a site cleaner than is needed to protect public health is inappropriate. Not true. The site was "clean" before industry dumped, spilled or otherwise contaminated the area and it should be returned to a condition comparable with other sites in the area. Why should innocent people have to live in an area that is only cleaned to, or just below, "safe levels"? They are not responsible for the problem; they didn't benefit from the profits, and thus shouldn't be expected to accept a less clean environment than found in a neighboring community.

Chapter 4

Point of Measurement

The second major component of how clean is clean is deciding where to apply the cleanup goal (the point of measurement), whether the goal is zero, standards or background. At first, each cleanup goal was discussed without bringing in point of measurement. This resulted in lively discussion that left many questions unresolved. However, once point of measurement was discussed, people quickly recognized how important it is and how it influences their thinking on cleanup goals.

Three points of measurement were discussed: edge of site, edge of property line and center of site. However, each site is different. For example, several participants argued that their site had no "center", but rather was a large area of contamination that in some instances was a narrow strip of land several miles long. Clearly, actual sites do not always conform to simple evenly divided shapes. However, for discussion, three locations were selected and their advantages listed.

One thing quickly became clear. Once you move off the center of the site, you then have two cleanup goals; one for where you apply the cleanup goal (point of measurement) and one for the center of the site. While a goal is officially set for the point of measurement, none is set for the center of the site. Instead, computer models are needed to predict how much of the contamination will move out of the site and how much cleanup is needed to prevent contaminant levels from exceeding the cleanup goal at the point of measurement. Consequently, if a location different from the center is chosen, then the amount of cleanup at the center of the site will differ from site to site, depending on what the computer models predict (these predictions are based on how much contamination is present, how mobile it is, permeability of soils and many other factors that have to be fed into the computer).

Participants were not willing to live with a higher cleanup goal if the point of measurement was the property line. The further from the center of the site the cleanup level was applied, the lower the cleanup goal had to be. The reasoning for this was simple: the further from the center you apply the cleanup goal, the more contamination remains at the center. This contamination could continue to threaten the environment and people's health. This is not clean-up but rather containment of the contamina-

tion, and no one was comfortable with this approach to cleaning up waste sites.

Edge of Property Line

This is the outer boundary of the property owned by the company where the site exists. Often a dumpsite is only a small portion of a property. In this case, the cleanup goal must be achieved only at the property line and beyond. Inside the property line, the numbers can be higher so long as the goal is not exceeded at the property line. ANY of the proposed cleanup goals could be applied at this point. All result in the same basic problems.

Advantages:

- Less expensive.
- Keep contaminants away from residential areas.

Disadvantages:

- It could be a very large area (especially if industry chooses to purchase more properties surrounding the site).
- Does not permanently take care of the problem. The contamination is still there. Thus, the company still would have a "stigma", thus affecting growth and property values.
- The site would have to be monitored and maintained forever. The larger the area the more costly this would be and the more likely a leak would be missed.
- At best, the contamination would only be contained. Chemicals could once again leak out, thus requiring further cleanup and risks to the community.
- The site and surrounding property would be rendered useless for further use.
- Industry would only have to achieve the cleanup goal at the property line. ANY technology that achieves this would be "acceptable". Containment would likely be used since it would be the cheapest, most cost effective way to achieve compliance. Permanent technologies would thus be used even less because there would be no incentive to use them.
- Relies on transport modeling to determine how much cleanup is needed to ensure that the cleanup goal is not exceeded at the property line.
- Establishes two cleanup goals: one at the point of measurement, the other for the amount of contamination that must be removed, treated or in some way contained in order to ensure that the cleanup goal at the property line is not exceeded.
- Allows land inside the property line to possibly become contaminated (so long as the cleanup goal is not exceeded at the property line) and for clean areas outside the original property line to become contaminated if the owner is allowed to buy more property thus moving the property line further from the center of the site.

The discussion brought out several important factors, which come into play as you move away from the center of the site. First, there are now two cleanup goals; one set at the point of measurement and one to determine how much contamination needs to be addressed (removed, treated, contained, etc.) to ensure that the goal at the property line is not exceeded. This is done using computer models which predict how much of the wastes will move. People were uncomfortable with relying on models and with the many uncertainties that go with their use.

Second, people realized that the further the point of measurement is from the center of the site, the less actual cleanup is needed and the more likely containment will be used. As a result, the participants felt strongly that the further the point of measurement was from the center, the lower the cleanup goal at the point of measurement had to be, especially if it were at the property line.

The Edge of the Waste Site

In this scenario, the point of measurement would be the boundary or edge of the site. In some cases, boundaries are not well known. In this case, the edge would be as close as possible to the center. Many of the same concerns raised for property line are applicable, although a separate list of advantages and disadvantages were prepared.

Advantages:

- Not as expensive as total removal.
- May keep wastes away from residential areas.
- Should require cleanup of or removal of most wastes from site – but specifics will vary from site to site.
- More acceptable to industry.
- Avoids responsible parties purchasing land as buffer zones around problem site.

Disadvantages:

- Does not permanently resolve the problem – the contamination will still be there.
- The site will most likely only be contained.
- The site may leak again and cause additional contamination, thus causing further cleanup and risks to the community.
- The site would not be able to be used again with certainty that there would be no future problems (such as use for a park).
- The "stigma" of the site will remain with the community making it difficult for the neighborhood to grow and for property values to return to normal.
- Monitoring and maintenance must be done for even a very costly program.

Center of the Site

The final location discussed was the center of site. While the title is self explanatory, it is not necessarily easy to define the center. Does the center mean the center of the surface? The middle of the site or at some depth downward? What about the oblong odd-shaped sites that have no obvious center? Clearly contaminated sites are not symmetrical shapes that lend themselves to a simple center concept. (In some cases, there may actually be more than one center.) The idea behind using the center of the site is to find approximately the middle of the site or several locations on-site where most of the contamination exists, generally at some depth below the surface.

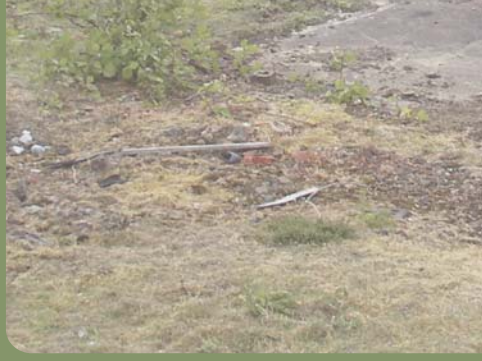
Advantages:

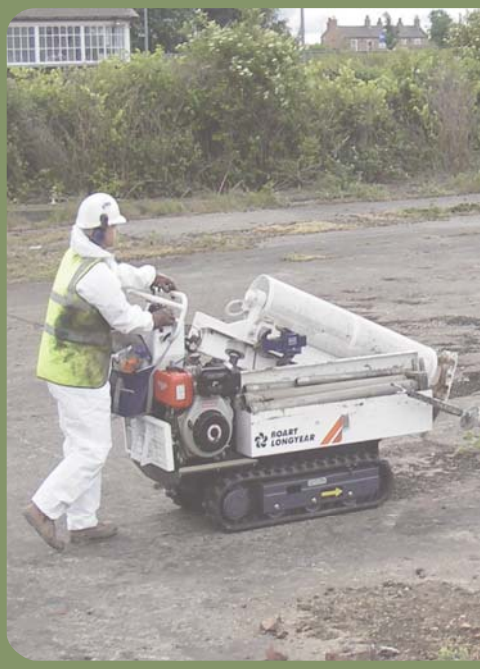
- Could force industry to totally and permanently remove most, if not all, the contaminants from the site.
- There would be no need or little need for further monitoring and maintenance of the site.
- Cleanup of future problems would be almost non-existent since most wastes are gone.
- The stigma on the community (due to the site) and lost property values could be removed thus revitalizing a community.
- Money would be saved on long-term monitoring and maintenance, as well as personal costs such as property value losses.
- Permanent solution to the problem.
- The site may be used again for a park, etc., if cleaned up enough.

Disadvantages:

- Very costly. However, it is unclear how high upfront costs compare with the long-term costs.
- Technology doesn't exist to permanently dispose of all contaminants; this too, is questionable, since many argue that technology does exist.

- It is more dangerous and poses more risks for the community to remove contamination than to leave it there (this may be better judged on a case by case basis).
- Removal through transport creates additional risks to others outside the impacted community.
- The contamination end up "somewhere" else, most likely in another dumpsite.





"CHEJ is the strongest environmental organization today – the one that is making the greatest impact on changing the way our society does business."

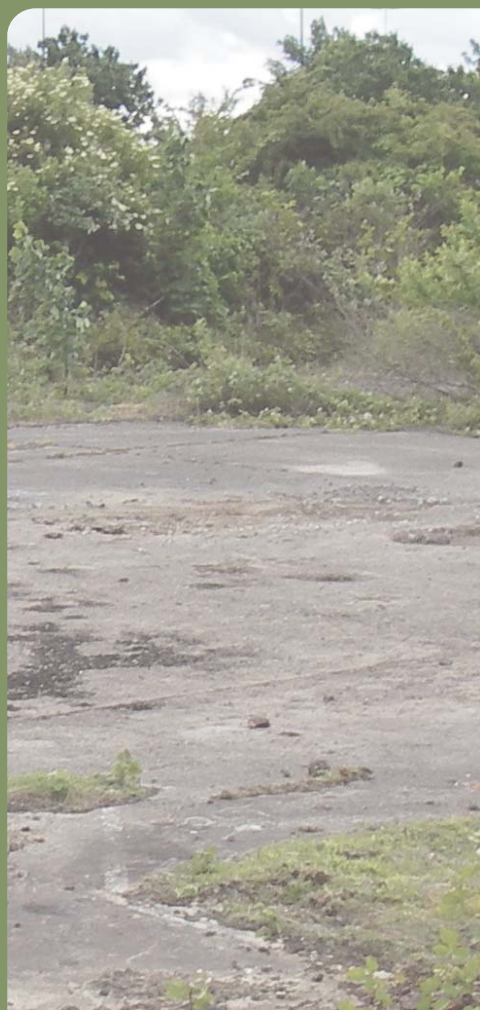
Ralph Nader

"CHEJ has been a pioneer nationally in alerting parents to the environmental hazards that can affect the health of their children."

New York, New York

"Again, thank you for all that you do for us out here. I would have given up a long time ago if I had not connected with CHEJ!"

Claremont, New Hampshire



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