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NET WORKS

CASE STUDIES IN WEB ART AND DESIGN

ROUTLEDGE



7 SUPERFUND365

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Project Summary

Superfund365 is an online, data-visualization application that consists of 365 Superfund sites—i.e., the nation's worst hazardous waste sites as designated by the Environmental Protection Agency (EPA). For one year, *Superfund365* featured a site a day, graphically depicting public data such as present contaminants, responsible parties, and regional demographics along with text and image contributions from users.

Project Developer Background

This is a project that fell into my lap. I did not necessarily have time for it. I was not looking to take on something new. But sometimes a statement of fact, a passing comment, or even an image can trigger such intense curiosity that you find you are in pursuit of answers and, before long, you are producing a new body of work.

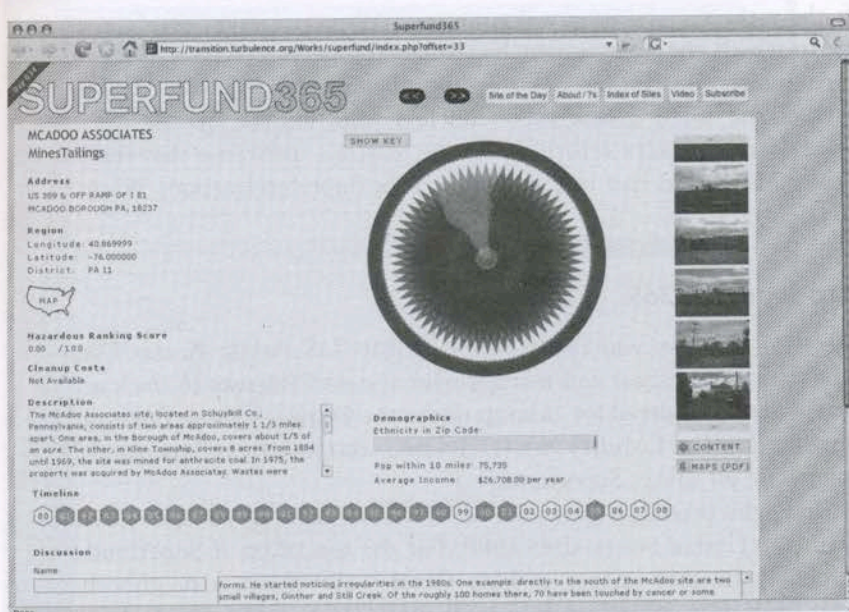


Figure 7.1 Superfund365.org screenshot (McAdoo Associates, day 34 of *Superfund365*).

In early 2006, I met Robert J. Martin, the former National Ombudsman for the EPA, at a pub near Times Square to discuss air sampling in New York City. I had just been awarded a commission with my collective, Preemptive Media, from Eyebeam Art + Technology Center and the Lower Manhattan Cultural Council to build portable air-monitoring devices. The project, which was launched in 2007 as *Area's Immediate Reading (AIR)*, started with the basic premise that the air-quality map of New York City would look radically different if the monitoring devices that supply the data were (a) mobile and (b) in the hands of citizens rather than located at fixed stations selected by the government. The purpose was to build micro air-quality reports that are based on individual paths through the city and that could be aggregated dynamically to determine general readings, an alternative to the Air Quality Index.¹

A professor of politics and environmental studies at Ithaca College told me that anyone designing a project to measure air quality in New York should contact Robert Martin. From 1992 to 2002, Martin served as the EPA National Ombudsman or mediator between the American public and the US government agency that is charged with protecting human health and the country's natural environment. On 9/11, Martin was driving to his office at the EPA headquarters in Washington, DC, when the World Trade Center collapsed and the streets of New York were blanketed in a record amount of the most toxic substances known to man.

Shortly after we met, Martin said that he could not help much with my technical questions about monitoring hardware and testing for contaminants; he referred me to his former colleague, a scientific advisor, for that information. Instead, he told me what it was like at the EPA in the days following 9/11. While Americans mourned and worried about further attacks, EPA employees immediately recognized the gravity of the environmental impact, swiftly mobilized a team of first responders, and internally debated whether all of Lower Manhattan should be declared a Superfund site, a site so hazardous that it warranted the relocation of inhabitants and immediate cleanup. Martin paused and rephrased his last comment: all of Lower Manhattan qualified for Superfund in 2001.

When I left the meeting, my mind was spinning with information and new insights into the extent to which the government had failed the people of New York and the extreme measures the administration took to ensure that Wall Street would be functioning within days of the worst attack ever launched from abroad against the United States.² The one statement I kept returning to was Martin's insistence that the damage inflicted on Lower Manhattan had met the criteria for Superfund action. What *exactly* did that mean?

Introduction to Superfund³⁶⁵

If you visit the EPA website, you can access the CERCLIS Public Access Database.³ CERCLIS is "the national database and management system EPA uses to track activities at hazardous waste sites considered for cleanup under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as Superfund."⁴ This is the official source for all things Superfund.

Superfund, I have discovered, is generally an unknown term to younger generations or people born in the United States after 1980. For the rest of us, if Superfund means anything, it probably invokes images of Love Canal. Love Canal, a neighborhood in Niagara, NY, was built atop 20,000 tons of toxic waste. In the mid-1970s, Lois Gibbs started a movement in her community by going door to door polling people about their

health problems after her son fell sick and she learned his elementary school was directly above the contamination hot zone. After several years of demanding protection and fed up with government inaction, the community held hostage several EPA officials. This garnered national media coverage and public outrage.⁵

In the wake of these events at Love Canal, the Federal Superfund program was enacted "to address abandoned hazardous waste sites ... [allowing] the EPA to clean up such sites and to compel responsible parties to perform cleanups or reimburse the government for EPA-led cleanups."⁶ At that time in the early 1980s, regulators thought there were only a small number of sites eligible for Superfund designation and that the original \$1.6 billion trust would be ample to fund the program. But more sites qualified for Superfund status than anticipated, and each year many more sites were added to the list than cleaned up. As of May 2010, there were a total of 1,279 sites on the National Priorities List (NPL) of the worst hazardous waste sites as identified by Superfund.⁷ Thousands more sites, specifically 13,253, were active or are under consideration for NPL designation, while another 35,593 were archived sites labeled as "no longer of interest" in the database.⁸

The interface to CERCLIS is a search form offering numerous points of entry into this massive database (see Figure 7.2). Like many other online databases, CERCLIS is not particularly welcoming: it is text heavy, it does not encourage browsing, and, although a lot of information can be extracted, it does not easily produce understanding. It reminds me of my dislike for shopping malls; I will enter only if I know exactly what I want and where it is so I can get in and out as quickly as possible. My initial curiosity about Superfund was dampened by the data deluge. I began to think about user interfaces and the experience of this information on screen versus my one-on-one conversation with Martin. How could I bring the two closer together? Just how public, in fact, was this public database?

Figure 7.2 A view of the CERCLIS interface.

Technical Description

From the start, I was convinced that I should follow a one-a-day format for several reasons. There was so much data that highlighting a new site each day created a manageable pace and avoided overwhelming my visitors. A one-a-day format also allowed a narrative to unfold and I pushed this even further by structuring the project as a travelogue. I knew I would not be able to spend a whole year visiting a different Superfund site each day and the project did not actually require this, but the personal descriptions of place and the “just-snapped” photographs brought the sites to life. In other words, the data became more meaningful and had more of an impact when presented from a human perspective. My hope was that as the journey moved further from my home in New York City, I could use social networking and media attention to attract others to pick up the route with me and, eventually, for me.

When looking at the data, I decided that the main attributes of a Superfund site as described by CERCLIS consisted of the contaminants of concern, the contaminated media (or where the contamination is found), the total site acreage, and the responsible parties. Therefore, this set of data makes up the primary visual of *Superfund365*, which is colorful and flower-like. It is an animation that unfolds and beckons continuing exploration.

As I was designing, I was consciously using beauty as a lure. Specifically I was reacting to the BP logo and rebranding efforts. In 2000, BP adopted a bright green and yellow sunburst or helios for its logo because, in the company's own words, it symbolizes “dynamic energy in all its forms.” The same year the company shed the name British Petroleum for BP to allow for new associations like “better people, better products, big picture, beyond petroleum.”⁹ BP's logo and rebranding are acts of visual veiling; we are instructed to look beyond (beyond the dirty and destructive practices of oil extraction) toward better (meaning select and cheery) outcomes.¹⁰ My visualization is an ironic riff on the BP sunburst. My visual is not there to distract and deceive with manufactured marketing ploys, however, but rather it is intended to entice and lure users into content such as the CERCLIS database.

Scrolling over the individual parts of the *Superfund365* visualization presents specific data like a present contaminant or total number of acres affected. Certain features are also clickable and take a viewer to outside websites. For instance, many of the contaminants link to the appropriate public health statement from the Agency of Toxic Substances and Disease Registry and a responsible party (typically a business) link to the representative website.

After a user interacts with the visualization once and understands its parts (with help from tooltips and a key), it is easy to move forward or backward through the days and immediately grasp if a site is large or small, has many or few responsible parties, has many or few contaminants, and the type of media. This was an essential feature for me. It was important that each of the 365 sites have a unique page, but also that the pages be viewed in relation to one another and easily compared. Making connections between sites is not possible using the current CERCLIS interface provided by the EPA.

The primary *Superfund365* visualization is framed by more information: site name, site type, address, latitude and longitude, Congressional district, map, EPA Hazardous Ranking Score (HRS), cleanup costs to date, site description, EPA action timeline, and demographics. There are images along the right-hand side, which are a mix of EPA documents, historical photographs, Google image results, my photographs, and user-contributed images. Users can also contribute text in a discussion forum at the bottom of the page.

I determined the layout of the page early in the design process. I knew how I wanted it to look and function only after a few days of studying CERCLIS. It then took three months

of solid work with a research assistant, programmer, and business analyst to build the online application and get *Superfund365* up and running.

Most of the work was fairly tedious. The data contained in the CERCLIS database is public and freely available for download but only in a format called CSV or comma-separated values. This format is not the most current and there is a greater potential for making errors when handling it compared with XML. Also, not all of the data I wanted to incorporate in my application was available as one neat download. My assistant, Emily Gallagher, and I had to call the Superfund hotline many times for help.

After downloading numerous datasets from CERCLIS and calling the hotline, I realized that we would have to manually insert a substantial amount of data into our spreadsheets (which were to become the *Superfund365* database). This meant copying and pasting information from the EPA website or searching through PDF documents. When information was entirely missing, we had to request it by email or a phone call to the site manager.

I was most surprised to find that present contaminants for the sites are not in CERCLIS. All the Superfund sites included in *Superfund365* are on the NPL, which means the contaminant lists do exist. Sometimes the information was posted on the regional EPA website, but when we had to call a manager for the information, we would ask why it was not online. The most frequent response from site managers was that their contaminant list was not final and more in-depth testing was needed.

The site managers were generally very willing to help and pleased that someone was expressing interest in their site. When we told them what we were doing, they were interested and supportive mostly because we would be drawing attention to their work and the problem of Superfund.

Piecing the information together took a lot of time, as did cleaning up the data. We found a lot of inconsistencies and inaccuracies—so many that we did not attempt to fix them all. We tried to standardize the contaminant list since it was central to the project. One contaminant can be spelled in several different ways, which, of course, undermines the integrity of the database and makes it impossible to search for how often a single contaminant appears in all 365 sites.¹¹

Kurt Olmstead, a business school graduate and skilled programmer, tackled the irregularities apparent in the responsible parties' dataset in CERCLIS. He was able to generate the most current responsible party (as these change due to buyouts and spinoffs or can be obscured through subsidiaries) by extracting information from the SEC EDGAR database, Wikipedia, and Yahoo finance. By cleansing and standardizing the responsible party names, it was then possible to rank them by HRS, list their entity type (e.g., public company, private company, or government agency) and link to existing websites.

This narrative should suggest the extreme tedium that comes with data entry and database development. And there is more! We still had to build the image database. I wanted to include all EPA documents (maps, diagrams, photographs) related to the sites in the image gallery as well as any images describing the general location or the actual site that we could find. This entailed hours of online research (and sometimes more emails and phone calls), downloading and batch processing of images, and then, finally, uploading the files to the growing *Superfund365* database. This way, when the project launched, each site would have at least a few descriptive images and I hoped more would be submitted by users over time.

The programmer on the project, John Kuiphoff, was responsible for taking the spreadsheets and writing PHP scripts to generate the *Superfund365* database. That was probably his easiest task. More difficult was translating my initial Illustrator sketch into Flash and making an application that functioned with the *Superfund365* database. The

final outcome looks implausibly similar to my sketch, which says a lot about John's programming capabilities. We decided to use the Flash programming environment because it would guarantee that the application would appear consistently across browsers and most browsers are equipped to view Flash content. Other emerging technologies, like AJAX, were considered but we did not feel they were up to the job at the time. In retrospect, this was a mistake. Flash is a proprietary and inherently closed system; developing the project in such a way that our information could be easily exported, used, and extended by others should have been a high priority.

Sources other than the EPA and CERCLIS were invaluable along the way and became part of the final application. I have already mentioned the Agency for Toxic Substances and Disease Registry (a division of the Center for Disease Control that was created along with Superfund in 1980). The Center for Public Integrity's investigation, "Wasting Away: Superfund's Toxic Legacy," provided excellent background research, including a list of the most dangerous Superfund sites. A Superfund "not having human exposure under control and/or not having contaminated groundwater migration under control" is classified as most dangerous.¹² The "Wasting Away" research aided me in selecting my 365 Superfund sites from approximately 1,300 on the NPL in 2007. The US Census Bureau provided the demographic information. As Lois Gibbs emphasizes in her video interview with me, you cannot talk about Superfund without talking about class and race.¹³

I have shared a good bit of detail about the building of the visualization application because it is important to understand the level of accessibility and usefulness of the public data that is at the core of the project. EPA officials often apologized to us when we inquired for more and better source data. I was later told by agency officials that *Superfund365* succeeds because it underscored the errors and irregularities of CERCLIS; several officials told me they preferred using *Superfund365* over CERCLIS.

This was not my purpose, but interesting nonetheless. My goal was to visualize and make tangible what was obscure and disparate. Pulling together various sources of public material and thus enabling new pictures and questions to emerge was paramount for me. That is why a user comment on the final day of the project, day 365 or Pearl Harbor Naval Complex, was very rewarding. The user posted:

Great work!! I have been tuned in regularly and have even worked on a few of the sites mentioned. I thought the Pearl Harbor description was a little weak. How does a sugar company become PRP [primary responsible party] for a naval base location?? Sounds like there is more to the story somewhere.¹⁴

Historical Perspectives

During the summer of 2007, when I was in the midst of producing *Superfund365*, English media artist, Graham Harwood, came for a studio visit. His reaction was: "Isn't this the business of government, not artists?"—which is a slightly different version of the more usual question, *why is this art?* I replied that I was filling a void, taking on the project in the absence of government, and, thus, aligning myself with environmental activists and non-government organizations (NGOs). In fact, artists—such as Mierle Ukeles, the Harrisons, and Mel Chin—have been doing the same thing for decades now.

With this work, I am not advocating that the EPA hire more sophisticated interface and interaction designers. That misses the point. I do, however, think the EPA (and likely every other US government agency) needs to do a much better job of maintaining (correcting, standardizing, updating) its data. In addition, the EPA needs to provide

data for the public in more useful formats, employing the newest trends in data sharing, manipulation, and visualization.

The fact that the EPA's data is inadequate and its reporting procedures are outdated probably does not come as a big surprise. Government agencies are notoriously slow and under-funded while the emerging tech world is neither. The government is aware that it needs to improve in this area. President Obama, on his very first day in office, released a memo in which he stated:

All agencies should adopt a presumption in favor of disclosure, in order to renew their commitment to the principles embodied in FOIA [Freedom of Information Act], and to usher in a new era of open Government. The presumption of disclosure should be applied to all decisions involving FOIA. The presumption of disclosure also means that agencies should take affirmative steps to make information public. They should not wait for specific requests from the public. All agencies should use modern technology to inform citizens about what is known and done by their Government. Disclosure should be timely.¹⁵

The government should make it as easy as possible for *anyone* (including artists, activists, NGOs, students, businesses, watchdogs, homebuyers, the general public) to access, use, and benefit from data. Obama emphasized the importance of openness, modern technology, and timeliness in his January 21, 2009, memo. In May 2009, the administration delivered on its promise and launched Data.gov, a user-friendly repository for all information the government collects. This is a positive first step, but there is also the issue of quality. For the producers of *Superfund365* and EPA officials working on Superfund, my project reveals the failings of government disclosure even when there *is* openness and public reporting. This is not apparent to most users of the site.

Discussing data quality can be straightforward. The quality of the EPA Superfund data would be improved greatly if the agency adhered to consistent names for present contaminants. If some data is less reliable than other information, that should be noted and the data should be disseminated anyway for whatever value it might provide.

Thinking about quality begs more difficult questions. What are the assumptions and ideologies that determine inclusion? What are the categories for classification and who is doing the classifying? With the Superfund program, I was told repeatedly that obtaining Superfund status is always a highly politicized process. The players typically are the government (federal, state, and local), industry (potential responsible parties), developers, community organizations, individual residents, and others. The conflicting interests, negotiations, and struggles are reflected in the CERCLIS database. For example, Lois Gibbs of Love Canal shared a fascinating story of why in the 1980s it was determined that a site must have a HRS of 28.5 or higher in order to qualify for Superfund designation. The decision had everything to do with politics and nothing to do with science.¹⁶

Gilles Deleuze reminds us, "machines are social before they are technical."¹⁷ Too often we believe our data is purely technical and forget its social dimension. Once someone or something (since automatic, computerized data creation is becoming the norm) translates our world into data, that data holds power over us. It makes decisions for us. It triggers action—or compels inaction. Lisa Gitelman writes about this problematic from a slightly different perspective in her book, *Always Already New: Media, History and the Data of Culture*. She states: "Media are frequently identified as or with technologies, and one of the burdens of modernity seems to be the tendency to

essentialize or grant agency to technology."¹⁸ "Data" could replace "media" in this quotation and the words are still true.

The list of academics and artists critiquing our data culture is long, but the conversation has also entered popular media. John Allen Paulos discusses the supremacy of data and questions the aptness of pervasive reliance on data-driven decision-making in a recent article in the *New York Times* called "Metric Mania: Do We Expect Too Much from Our Data?" He ends his discussion with these words: "This doesn't mean we shouldn't be counting—but it does mean we should do so with as much care and wisdom as we can muster."¹⁹

What is needed is a change in cultural perception of data and its technical underpinnings. Such a transformation occurred in the last century with respect to photography. In 1973, Susan Sontag eloquently debunked the myth of photography in her book *On Photography*. She described our relationship to photographs in this way:

Photographs furnish evidence ... A photograph passes for incontrovertible proof that a given thing happened. The picture may distort; but there is always a presumption that something exists, or did exist, which is like what's in the picture. Whatever the limitations ... a photograph—any photograph—seems to have a more innocent, and therefore more accurate, relation to visible reality than do other mimetic objects.²⁰

I like to think *Superfund365* is playing a role in debunking the database myth. In other words, it challenges our perceived relationship to the data, it reveals the structure of the database and allows for new configurations and correlations. It begets new articulations and, as a result, new dialogues. It confuses as much as explicates. It challenges the very concept of incontrovertible proof. It simultaneously pays homage to the existence of public data and encourages government to improve. This is not about being for or against counting, but is rather a call for greatly expanding who is doing the counting and how results are circulated to support multivalent uses.

As I was writing the conclusion to this chapter, I ran into Tim Dye at a locative media symposium in San Francisco. Tim Dye is a Senior Vice President at Sonoma Technology, Inc., where he helped to develop, and now manages, AIRNow. AIRNow is an EPA program that makes accessible air-monitoring data from across the country via the Internet. Dye knew about Preemptive Media's work developing portable air-monitoring devices, and he told me that within five years or so he believes such affordable and off-the-shelf devices will be publically available. In anticipation of this, Dye envisions the AIRNow program will support the use of these devices by citizen scientists across the country and will encourage the upload and integration of citizen data into the government's air-quality database. AIRNow would be co-produced by government and citizens alike. Independent data collection and visualization projects would not be forced into an adversarial role with the government but rather the relationship could be collaborative and mutually informative.

Jason Coburn describes the importance of co-production like this in his book *Street Science: Community Knowledge and Environmental Health Justice*:

[The] co-production model problematizes knowledge and notions of expertise, challenging hard distinctions between expert and lay ways of knowing ... [The] co-production model emphasizes that when science is highly uncertain, as in many environmental-health controversies, decisions are inherently trans-science—involving questions raised by science but unanswerable by science alone.²¹

This model and Dye's wishful approach to AIRNow is the future for data collection and visualization. It is democratic and responsive. It allows for numerous perspectives from professionals and citizens. Science is not accepted uncritically as fact but is co-produced by numerous stakeholders because the risks are high and solutions are urgently needed.²²

Conclusions and Outcomes

The focus of this chapter has been the original purpose of *Superfund365* and the production process for developing it. I have described the project as a data visualization application and what it means for me, as an artist, to use government-generated data as my medium.

But *Superfund365* is also a platform, meaning it is not only a place to visit and learn but also to share and connect with others for possible action. On the day it was launched, September 1, 2007, the project was a starting point rather than a completed work. From that day forward, the data visualization gave way to collective storytelling.

It is beyond the scope of this chapter to discuss in any detail the life of *Superfund365* after it was launched, but I will say that after staring at the EPA data on screen for several months, it was almost startling to visit the locations in person. The first several weeks, I traveled to every Superfund site highlighted in *Superfund365*, beginning with Quanta Resources in Edgewater, NJ, which is directly across the Hudson River from the Upper West Side. I expected to find the sites cordoned off and dotted with scientists in Hazmat suits, but this was not the case (see Figure 7.3). Very rarely were the places even marked as Superfund sites and only once did I see any cleanup activity. I found myself in such places as abandoned lots with DO NOT ENTER signs, the largest shopping mall in New York State, an abandoned softball field, an empty square block in a city center, and a Home Depot store. These were, I concluded, common, everyday places.

For this reason, Alex Prud'homme's 2010 Op-Ed in the *New York Times* resonated with me. He wrote:

We tend to think of oil spills as dramatic events—a sinking ship, a burning rig. So it's easy to forget that across the country, hundreds of spills, many left over



Figure 7.3 Quanta Resources Superfund Site, Bergen County, NJ (day 1 of *Superfund365*).

from a less regulated time, continue to poison groundwater and leak toxic fumes. Instead of letting the Gulf spill divert our attention yet again from slow-moving disasters like Newtown Creek, we should take it as an impetus to address problems much closer to home.²³

And who better to force attention to these sites, tell their histories, explain the consequences of contamination, and suggest solutions for building a better future than the people who call these places home. With one in four Americans living within four miles of a Superfund site, there is a lot of local expertise to be tapped.²⁴ The convergence of social media and off-the-shelf monitoring hardware offer tremendous potential for co-production. The challenge remains to transform this kind of knowledge production into actionable solutions.

Notes

1. See www.pm-air.net.
2. On Earth Day 2002, Robert Martin resigned as National Ombudsman. He left the EPA after Administrator Christine Todd Whitman eliminated his office's independence—and therefore its function as internal watchdog—through restructuring. Weeks before, Martin had issued a very public and frank condemnation of the EPA's handling of Lower Manhattan post-9/11 after holding two extensive public hearings. No replacement was ever hired and to this day there is no National Ombudsman at the EPA. To hear Robert tell his story, watch my video interviews with him ([link](#)).
3. [Cfpub.epa.gov](http://cfpub.epa.gov/supercpad/cursites/srchsites.cfm): <http://cfpub.epa.gov/supercpad/cursites/srchsites.cfm> (accessed May 18, 2010).
4. U.S. EPA: http://epa.custhelp.com/cgi-bin/epa.cfg/php/enduser/std_adp.php?p_faqid=173&p_created=1065036508 (accessed May 18, 2010).
5. To hear the story of Love Canal told by Lois Gibbs, watch the video interview on [Superfund365.org](http://turbulence.org/Works/superfund/video.html): <http://turbulence.org/Works/superfund/video.html>.
6. [Epa.gov](http://www.epa.gov/superfund/about.htm): www.epa.gov/superfund/about.htm (accessed May 24, 2010).
7. [Epa.gov](http://www.epa.gov/superfund/sites/query/queryhtm/nplfin1.htm): www.epa.gov/superfund/sites/query/queryhtm/nplfin1.htm (accessed May 24, 2010).
8. These numbers are in reports run one a month by the EPA and available for download from here: <http://epa.gov/superfund/sites/phonefax/products.htm>.
9. [Bp.com](http://www.bp.com/sectiongenericarticle.do?categoryId=9014508&contentId=7027677): www.bp.com/sectiongenericarticle.do?categoryId=9014508&contentId=7027677 (accessed May 24, 2010).
10. The extent of the dirty and destructive oil-extraction practices of BP came into sharp focus after the April 2010 Deepwater Horizon Gulf spill.
11. Because we did standardize the contaminant list, we were able to make a list of the top 25 contaminants of Superfund365, available at: http://turbulence.org/Works/superfund/top_25_cont.html.
12. [Publicintegrity.org](http://projects.publicintegrity.org/Superfund/HumanExposure.aspx): <http://projects.publicintegrity.org/Superfund/HumanExposure.aspx> (accessed May 25, 2010).
13. See video interview 003 with Lois Gibbs on Superfund365: <http://turbulence.org/Works/superfund/video.html>.
14. [Turbulence.org](http://turbulence.org/Works/superfund/index.php): <http://turbulence.org/Works/superfund/index.php> (accessed May 25, 2010).
15. [Eff.org](http://www.eff.org/deeplinks/2009/01/on-day-one-obama-demands-open-government): www.eff.org/deeplinks/2009/01/on-day-one-obama-demands-open-government (accessed May 25, 2010).
16. See video interview 001 with Lois Gibbs on Superfund365: <http://turbulence.org/Works/superfund/video.html>.
17. Gilles Deleuze, *Foucault*, trans. Sean Hand, Minneapolis, 1988: 13.
18. Lisa Gitelman, *Always Already New: Media, History and the Data of Culture*, Cambridge, MA: MIT Press, 2006: 2.
19. John Allen Paulos, "Metric Mania," *New York Times*, May 10, 2010. Online: www.nytimes.com/2010/05/16/magazine/16FOB-WWLN-t.html?scp=1&sq=metric%20mania&st=cse (accessed May 25, 2010).

20. Susan Sontag, *On Photography*, New York: Bantam Doubleday Dell, 1973: 5.
21. Jason Corburn, *Street Science: Community Knowledge and Environmental Health Justice*, Cambridge, MA: MIT Press, 2005: 41.
22. For more on this topic, see Silvio O. Funtowicz and Jerome R. Ravetz, "Science for the Post-normal Age," *Futures*, 25, 7, September 1993: 739–755.
23. Alex Prud'homme, "An Oil Spill Grows in Brooklyn," *New York Times*, May 14, 2010. Online: www.nytimes.com/2010/05/16/opinion/16Prudhomme.html?scp=1&sq=Alex%20Prud%27homme&st=cse (accessed June 10, 2010).
24. Americanprogress.com: www.americanprogress.org/issues/2006/06/b1777527.html (accessed June 18, 2010).

Bibliography

- BP. "BP brand and logo." Bp.com: www.bp.com/sectiongenericarticle.do?categoryId=9014508&contentId=7027677 (accessed June 21, 2010).
- Center for American Progress. "The Toll of Superfund Neglect." Americanprogress.org: www.americanprogress.org/issues/2006/06/b1777527.html (accessed June 21, 2010).
- Center for Public Integrity. "Most Dangerous Superfund Sites." Publicintegrity.org: <http://projects.publicintegrity.org/Superfund/HumanExposure.aspx> (accessed June 21, 2010).
- Corburn, Jason. *Street Science: Community Knowledge and Environment Health Justice*. Cambridge, MA: MIT Press, 2005.
- Electronic Frontier Foundation, "On Day One, Obama Demands Open Government." Online: www.eff.org/deeplinks/2009/01/on-day-one-obama-demands-open-government (accessed June 21, 2010).
- Deleuze, Gilles. *Foucault*. Trans. Sean Hand. Minneapolis: University of Minnesota Press, 1988.
- Funtowicz, Silvio O. and Jerome R. Ravetz. "Science for the Post-Normal Age." *Futures*, 25, 7, September 1993.
- Gitelman, Lisa. *Always Already New: Media, History and the Data of Culture*. Cambridge, MA: MIT Press, 2008.
- Paulos, John Allen. "Metric Mania." *New York Times*, May 10, 2010.
- Prud'homme, Alex. "An Oil Spill Grows in Brooklyn." *New York Times*, May 14, 2010.
- Sontag, Susan. *On Photography*. New York: Bantam Doubleday Dell, 1973.
- US Environmental Protection Agency. "Basic Questions." Online: www.epa.gov/superfund/about.htm (accessed June 21, 2010).
- US Environmental Protection Agency. "Final National Priorities List (NPL) Sites—by Site Name." Online: www.epa.gov/superfund/sites/query/queryhtm/nplfin1.htm (accessed June 21, 2010).
- US Environmental Protection Agency. "Frequent Questions." Online: http://epa.custhelp.com/cgi-bin/epa.cfg/php/enduser/std_adp.php?p_faqid=173&p_created=1065036508 (accessed June 21, 2010).
- US Environmental Protection Agency. "Report and Product Descriptions." Online: <http://epa.gov/superfund/sites/phonefax/products.htm> (accessed June 21, 2010).
- US Environmental Protection Agency. "Search Superfund Site Information." Online: <http://cfpub.epa.gov/supercpad/cursites/srchsites.cfm> (accessed June 21, 2010).

Links

- <http://cfpub.epa.gov/supercpad/cursites/srchsites.cfm>
- www.data.gov
- <http://turbulence.org/Works/superfund/index.php>
- <http://turbulence.org/Works/superfund/video.html>
- <http://projects.publicintegrity.org/Superfund/HumanExposure.aspx>