Before and after photos of a brownfield property along the Detroit River in Wyandotte, Michigan

Application of Field-Based Characterization Tools in the Waterfront Voluntary Setting

Prepared by

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National Network for Environmental Management Studies Fellow

Compiled May - July 1999

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U.S. Environmental Protection Agency
Office of Solid Waste and Emergency Response
Technology Innovation Office
Washington, DC
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Acronyms

ASTSWMO - Association of State and Territorial and Solid Waste Management Officials
CADF - Confined Aquatic Disposal Facility
CDF - Confined Disposal Facility
CERCLA - Comprehensive Environmental Restoration, Compensation, and Liability Act
CFR - Code of Federal Regulations
CMI - Clean Michigan Initiative
CS - Contaminated Sediment
CWA - Clean Water Act
CWSRF - Clean Water State Revolving Fund
CZMA - Coastal Zone Management Act
DEQ - Department of Environmental Quality
DEP - Department of Environmental Protection
DOI - Department of Interior
EDA - Economic Development Authority
EIS - Environmental Impact Statement
ESA - Endangered Species Act
FRTR - Federal Remediation Technologies Roundtable
GIS - Geographic Information System
MPRSA - Marine Protection, Research, and Sanctuaries Act
NAS - National Academy of Science
NFA - No Further Action letter
NOAA - National Oceanographic and Atmospheric Administration
NRC - National Research Council
NRMRL - National Risk Management Research Laboratory (ORD)
NSI - National Sediment Inventory
ORD - Office of Research and Development (EPA)
OSWER - Office of Solid Waste and Emergency Response (EPA)
OSPS - Outreach and Special Projects Staff (EPA)
PRP - Potentially Responsible Party
RCRA - Resource Conservation and Recovery Act
RHA - Rivers and Harbors Act
RLF - Revolving Loan Fund
SITE - Superfund Innovative Technology Evaluation
SVE - Soil Vapor Extraction
TIO - Technology Innovation Office (OSWER)
TOSCA - Toxic Substances Control Act
USACE - U.S. Army Corps of Engineers
UST - Underground Storage Tank
VCP - Voluntary Cleanup Program (state)
WES - Waterways Engineering Station of USACE
WRDA 96 - Water Resources Development Act of 1996
XRF - X-ray Fluorescence

For additional definitions and acronyms, please refer to glossaries located in recommended reading documents at the end of this report

Abstract

Voluntary action to redevelop potentially contaminated property operates under vastly different market constraints than mandated corrective action programs. Pressures exist that impact the time scale, cost/benefit ratio, priorities, and resources that allow the action to transpire. Non-market pressures, usually in the form of regulation, also affect decisions over the course of redevelopment. Together, these forces also determine the technologies and methods used to characterize the property, as well as the media sampled.

The waterfront voluntary setting provides added value to property owners, potentially providing a greater incentive to sink costs and invest in field portable technologies to characterize contaminated sites. Previous case studies[1] have shown that such tools are not only faster, but more cost effective in the long run, despite a high initial sticker price. However, while the information barrier concerning field-based soil assessment technologies continues to decline, and their application increases, assessment of common property resources, particularly aquatic sediment, remains infrequent without a clear cost recovery mechanism. This report will investigate the reasons behind that and detail the current level of field-based characterization tool application at 115 waterfront brownfield and Voluntary Cleanup Program (VCP) sites.

Progression and Goals of This Report

This paper began as an investigation into innovative remediation technology application in the federal Brownfields program. The rationale involved attempting to collect data for waterfront Brownfields similar to that contained in the Annual Status Report <http://www.clu-in.org/products/asr/> for Superfund and other documented sites.

It was known at the start of the research period that consistent documentation did not exist for Brownfields. However, after about two weeks of investigation, it became clear that few waterfront Brownfields sites had reached the remediation phase. Properties targeted under federal pilots comprised only seven of the 25 completed remediations noted here; nearly all of the other properties remained in various phases of characterization, and the attention of the project shifted to application of field portable assessment tools. Additionally, the data pool expanded to include the wider waterfront characterization market in both federal and state brownfield sites, as well as state VCP properties. Very little separates these categories in terms of characterization needs, as long as the setting remains constant for research control purposes.

Then, as now, evidence of aqueous sediment work was highly desired to test if, when, and how area-wide assessment issues were handled around waterfront property. Such evidence could suggest a market for field-based sediment characterization tools, if and when they become available. Due to cost recovery concerns, most of the voluntary work done on these completed sites involved only landward soil removal within a property boundary. This paper presents several lines of evidence to explain why that has been the case, and also explores mechanisms that allowed stakeholders to overcome such concerns and characterize area-wide problems like contaminated sediment (CS).

Lastly, the data set for this paper does not encompass all waterfront brownfield and voluntary cleanup sites nationwide, though with the advent of online databases, that goal appears at least possible for some states. Due to the brief 12-week supported research period, the goal was to gather as many sites as possible, regardless of geographic location. Therefore, the dataset is not recommended for making comparisons between varying state regulatory environments—however, it does adequately capture nearly all known activity on waterfront properties targeted through the federal Brownfields Initiative. Discussion of further research needs follows at the end of this report.

1. Introduction to the Voluntary Market

1.1 Important definitions

Brownfield (also, federal Brownfield): when capitalized, refers to property that a municipality, state, or other local government has identified for attention under an EPA Brownfield Economic Redevelopment Initiative pilot.

brownfield: any abandoned, idled, or underused industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination.

waterfront property: a parcel of land adjacent to any body of water, including streams, bayous, rivers, lakes, bays, estuaries, harbors, ports, and oceans.

innovative technology: alternative technology with limited full-scale application and a resulting lack of data on cost and performance. Many such technologies have been used for several years; however, information on site-specific cost, multi-media applicability, and performance under different regulatory constraints remains elusive.

media: the physical setting of the characterization process; any one of the following: soils, groundwater, aquatic sediments, air, surface water, etc.

contaminated sediment: aquatic sediment in a natural waterbody (non-industrial containment setting) that contains chemical concentrations posing a known or suspected threat to the environment or human health.

Terms used interchangeably: *field tool, field analysis or screening tool, field-portable tool*

firm: contractor or engineering company performing the characterization work. They obtain site characterization tools from vendors.

vendor: developer or supplier of site characterization equipment on the open market.

Sources: EPA—OSPS, EPA—TIO, NAS—NRC, and author.

1.2 Background

For most cities, waterfront property along rivers, lakes, bays, estuaries, ports and harbors holds the highest value and highest resale potential. As the marquee land for a city, it receives the heaviest use in all sectors (commercial, industrial, and residential), and reflects an image to outsiders and potential investors. Its setting also places it in a position to absorb large amounts of contamination, not only from heavy on-site use, but from sources higher in the watershed as well, through surface runoff, subsurface flow and aqueous transport.

The presence of brownfields along the waterfront hinders the economic health and tax base of a city, and is widely thought to attract crime and other social problems. Redevelopment of waterfront property often drives redevelopment in other areas of the city, particularly for second-tier properties located upland in nearby neighborhoods or industrial zones. For a city attempting revitalization, therefore, the waterfront is a natural place to start.

Depending on a municipality's resources and approach to redevelopment, it may place particular importance on certain priorities for initial waterfront brownfield redevelopment—namely, that it occurs rapidly and on a municipally owned property with a low likelihood of contamination. This not only accelerates the property's return to the tax base, it provides an easy example to convince lenders and property owners to redevelop second-tier sites and additional, more complicated, waterfront sites on their own. Indeed, this has been the example for countless Brownfield pilots across the nation[2].

The majority of municipal governments, however, lack the capacity and resources to undertake sustained site investigations and cleanups without significant state and/or federal assistance. Meanwhile, owners of contaminated property still perceive a number of legal and technical disincentives to stepping forward and sinking assessment costs that may lead to legal consequences[3].

In recent years, two program categories have sought to remedy these problems. At the federal level, since 1995, the EPA's Brownfields initiative has provided pilot grants to over 300

municipal, state, or tribal governments to explore and demonstrate reuse solutions. These grants seek to create frameworks for future redevelopment at the local level, with a focus on stakeholder involvement. Coinciding with the federal policy initiative, over 44 states now have some form of voluntary cleanup program (VCP), and approximately 28 have both state brownfield and VCP programs[4]. Nearly all (95%) of these programs have been developed during the 1990s, with an intent to limit owner liability through "No Further Action" (NFA) letters, cooperative agreements, and memorandums of understanding (MOUs) between EPA Regions and state regulators[5].

Very few brownfields pilots, however, and only a handful of state initiatives have allocated funds expressly to pay for site characterization or cleanup. Agencies at all levels currently lack funds for this purpose, even if the money remained within the public sector (for instance, a state-city transfer for a municipally owned property). Fortunately, the federal Brownfields Initiative, as well as most states, now have Revolving Loan Funds (RLFs) <http://www.epa.gov/swerosps/bf/rlflocat.htm> to lend resources for this purpose. The bill to reauthorize Superfund, S. 1285, which has languished in committee for over six years, also proposes interest-free loans of up to $200,000 explicitly for site assessment purposes[6]. In the meantime, however, the broader emphasis remains focused on developing frameworks so that redevelopment of potentially contaminated sites may continue after funds expire.

Barring a grant or loan to the municipality, the responsibility to pay assessment and remediation costs on a land parcel still rests with either the seller or a prospective buyer who has agreed to assume the risks. Given the needs and priorities of interested parties, cheaper, faster, more effective, and more accurate site characterization should arise as a major demand feature of all media in this market.

For many reasons, however, this only somewhat describes the present scenario for site characterization tools. Gorte (1999), for one, has accurately captured the challenges for such vendors seeking to enter the brownfields market[7]. While the issues she notes are not themselves unique to the waterfront setting—rather, they apply to the technology market on all brownfields projects—they are adequately embodied by the present situation in it.

1.3 Overall market size of the waterfront voluntary sphere

Before information collection began, an exercise was undertaken to estimate the number of waterfront properties falling within the scope of federal and state voluntary cleanup efforts.

Table 1. State VCP and Brownfield Programs at a Glance

VCP	*Brownfields*
• Forty-four (44) states have VCP programs (exceptions are VT, FL, KY, ND, SD, WY) • The majority of these were established by statute, most funded via participant fees or reimbursement. • Eligibility is generally defined by restrictions on the type of volunteer: municipalities, private industry, persons on/off the state priority/activity list, non-NPL, anyone not responsible for pollution, purchaser, owner/seller, or financial viability of site. • Virtually all provide incentives, such as tax rebates, relief from state liability, relief from some federal liability under cooperative agreement, not-to-sue covenants, ability to withdraw, NFAs, and technical assistance.	• 28 States also have brownfields programs, with varying criteria, including: any site eligible for VCP, local government lands only, no parties responsible for contamination, no other state or federal action on the property, and/or must have redevelopment potential. • Brownfield identification leaders - IL, DE, AR, MI, CT, and NY. • Illinois also has the most cleanups underway (~439). • Michigan and Delaware lead in total commitments to redevelopment. • The most common brownfield incentives are tax and liability relief.

In 1995, EPA estimated that 79,387 non-NPL known or suspected state hazardous waste sites existed in the United States[8]. These numbers were derived primarily from state hazardous site inventories and CERCLIS <http://www.epa.gov/superfund/sites/cursites/toc/>, the EPA database of potentially contaminated sites. Due to the fact that they are not listed under the federal NPL program, they constitute the balance of sites referred back to the states for action. Once referred back to the states, the properties remain subject to CERCLA and usually end up in so-called "state Superfund" programs, if the states have their own system of prioritization, cleanup, and reimbursement. Of those sites, EPA had information to suggest that 28,997 required further attention[9].

A 1999 report to the EPA from Kensington Systems, Inc., revised the total 1995 non-NPL figure upward to 92,057[10]. It found, however, "no such vehicles to track abandoned and underutilized sites…an important part of the brownfields definition," leaving the true number of brownfields potentially much higher[11]. In other words, Kensington found it difficult to distinguish which sites on the state Superfund rolls would receive attention through state priority, voluntary cleanup, and brownfields programs. The author sympathizes entirely, and has included the most comprehensive list of publicly accessible online databases in the "contacts" datatable.

Before further estimating the waterfront voluntary market size, one should note the impact of non-NPL "state Superfund" market size on environmental technology providers. The vendors remain highly reliant on state enforcement and voluntary actions once the federal facility and Superfund (NPL) work realms are removed from consideration. Furthermore, the health and activity level of a state's mandated corrective action program often parallels and sometimes supports its activities in the voluntary sector. With only 11 State Superfunds spending more than $10 million in 1997, the already fragmented market has had its viability extremely limited in some places[12]. The most current data shows that[13]:

- Six states represent 76.4% of total state Superfund balances
- States represent 43.7% of the total amount added to funds in FY 1997.
- 11 states (including NE, which has no fund) have fund balances insufficient to cover a single cleanup.

Between EPA and the states, no known datasets group specific voluntary sites by contaminant, setting, ownership, or other criteria. For the total number of waterfront properties, we might assume a back of the envelope calculation around 5-10% of the Kensington figure. This hypothetical number has relevance both to the present field-portable technology market and to prospective common property resource (groundwater, sediment) assessors. It is clearly not, however, the limit of the universe for either service provider. Field-portable and on-site lab technology in particular emphasize widely applicable soil and groundwater characterization tools. This sublevel of analysis instead represents the ripest potential market in the voluntary sector for both groups of characterization tool developers. Therefore, this sublevel provides the same obstacles with a much larger overall market size, potentially revealing a more realistic picture of actions transpiring outside the realm of mandated corrective action and/or demonstration programs. The goal will be to assemble a representative dataset with a small fraction of this sublevel.

1.4 Market fragmentation by contaminant

For any contaminated site, the possible assessment technologies depend on the possible contaminants desired for detection. The FRTR Field Sampling and Analysis Matrix (Version 1.0) <http://www.frtr.gov/site> presents most necessary information about such tools and their proper contaminant applications, though, as the name states, its emphasis rests with sampling and collection, rather than longer-term detection and monitoring. While many tools can serve a variety of purposes including detection, screening, and monitoring, the obstacles to designing a multi-*contaminant* assessment tool are many. This causes the characterization

technology market to become fragmented by the diverse, contaminant-specific nature of sites. Additionally, sites with multiple contaminants may require several completely different detection tools. Even conventional "non-detect" soil samples, once tested, usually cannot undergo further analysis, because initial testing chemically alters them. Before the advent of field-based technologies, this last fact often necessitated multiple rounds of site sampling.

1.5 Why use field-based tools for waterfront and other voluntary sites?

Field-based tools provide advantages in cost effectiveness and speed, and can screen samples to provide better definition of contaminated areas. Some newer on-site analysis tools can provide results on par or even more accurate than those in labs, depending on the contaminant, its sample handling requirements, and its propensity to degrade or volatilize. For waterfront properties, due to the variety of media that *should* be tested, screening and on-site analysis tools can provide dramatic savings and eliminate the need to hire multiple contractors for multiple rounds of sampling. The sizable turnaround value of a clean property may offset the high sticker price of using field-portable tools—a key reason for choosing this setting over others for research. Most importantly, the waterfront voluntary setting may provide the only opportunity for further assessment of common resources—specifically aquatic sediment—in the near future.

1.6 General obstacles to field-based characterization technologies under current programs

Many reports have dealt with the following points as "the barriers to brownfield redevelopment," and Gorte has addressed most regarding their impact on innovative technologies. Without reinventing them, it seemed necessary to mention them here before proceeding further, including elements unique to the waterfront voluntary setting where appropriate.

- **Funding sources**—Funding questions with waterfront brownfields and VCP sites are not as easy to answer, despite the sizable turnaround value of a clean property. In communities where federal pilots have been in place for some time, some property owners and municipalities have waited for government or RLF support before proceeding further with redevelopment, even though they may have taken previous voluntary action. Without such support, funding sources for what is by nature a voluntary cleanup process remain solely in the private sector. Currently, many perceive that the greenfields setting still provides a more secure investment and a more rapid turnaround for private capital.

- **Time scale**—Lenders and investors demand rapid turnaround and have little tolerance for cost overruns due to uncertainties or incorrect application of technology.

- **Cost**—The limited amount of innovative technology application in all media has limited cash flow for vendors, causing "sticker" prices to remain higher than the non-innovative remedies. This affects in-house research and development and the availability of characterization and remediation technology overall. Cost/benefit and performance information, where innovative technologies—especially for characterization—tend to perform better relative to conventional methods, is now more readily available, though regulatory acceptance lags dramatically.

- **Questions on effectiveness**—Most importantly, state and local officials have regularly refused to approve characterization and cleanup plans with "unproven" technology, instead insisting on a sampling standard far in excess of that required by a risk-based approach. Lenders and investors, as well as contractors and engineering firms, also tend to frown upon any method that has not seen significant full-scale application. This effectively closes the market for

hundreds of thousands of brownfields sites to technology vendors.

- **Field problems**—Using technology correctly remains a problem in some field cases. Firms must train personnel to use the tools properly, but more importantly, someone with a chemistry background should review the sampling/screening/ analysis plan to denote the best way to achieve data quality objectives with the new technology.

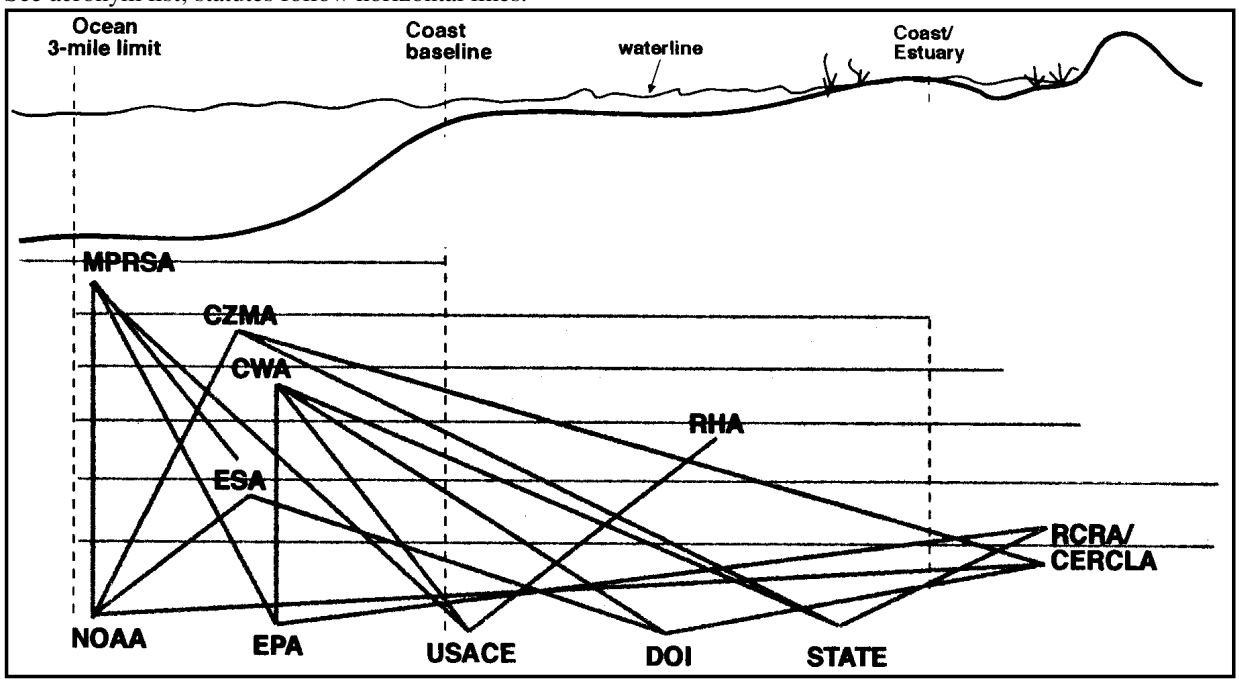
The above problems leave a limited number of providers. In the latter case, a company may lose incentives to develop new technology if that sector is not making a profit, forcing many firms to look overseas—particularly to Europe—where fewer regulatory issues provide greater comfort. Several analysts have set an informal timeline of five years for American firms to enter the international market, fearing that further delays will force some firms out of business[14].

2. Assessing Aqueous Sediment

2.1 Identifying contamination and the decision to characterize

The diagram illustrates that responsibility for sediment issues in the marine waterfront voluntary setting is at best unclear. Further inland, states claim domain over inland waterways such as rivers and lakes, but the agency and statutory web (CWA, ESA, RCRA/CERCLA, RHA; NOAA, EPA, USACE, DOI, States) remains just as complex. Theoretically, phase I investigation results should provide the impetus for a sediment investigation during the succeeding assessment phases. However, constraints surrounding the voluntary and brownfield process often lead to minimal (surface grab), if any, sediment investigation—rather than a more preferable area-wide approach to redevelopment and assessment. The following scenarios illustrate why sediment sampling occurs less frequently in this setting:

Figure 1. Agency and statutory responsibilities for CS along the marine waterfront
See acronym list; statutes follow horizontal lines.



Source: 1997 NRC Report <http://www.nap.edu/catalog/5292.html> Figure 1-1 (see endnotes)

For reference, nearly all CS cleanup *on record* comes primarily from Superfund, employing conventional dredging and disposal, capping, or stabilization methods. Though a number of innovative ex-situ treatments have been accomplished using dredged material, few in situ sediment treatment methods <http://clu-in.org/products/renhold.htm> have passed beyond the demonstration stage. Soon-to-commence beneficial reuse demonstrations will attempt to enhance the viability of navigational dredging, although debates continue about dredging's overall effectiveness as a remedial action tool.

1. Potential extent of problem not viewed as a threat to human health
   A phase I investigation may conclude that even if contaminated aqueous sediment exists, it would pose no risk to human health and the environment due to environmental factors like desorption over time or natural recovery (natural influx of clean sediment that serves as a cap). Additionally, the total release may be limited to a safer range if the facility did not discharge directly into the water body and if groundwater contamination appears unlikely. In these cases, the phase I work would have correctly addressed the possible CS issue and concluded that the potential risk did not justify additional testing.

2. Problem not proximate to an area where human health might experience an impact
   This rationale, though similar to the first, differs in that the phase I assessment will only address CS if some part of the contamination may impact a municipal good, such as a beach, water supply well/intake, or game fish. In some states, namely Michigan, state assessment and characterization funds are explicitly provided according to these priorities. The state's environmental bond fund, the Clean Michigan Initiative <http://www.migov.state.mi.us/issues/CleanMI.pdf>, has carried out several projects according to these criteria[15]. However, little incentive remains to address CS in phase I, if funding to test it in phase II depends on a factor not present—a factor that, even if present, would likely result in an institutional control (i.e., fish advisory, beach closure) rather than a removal action.

2a. Preference for institutional controls
   Institutional controls mitigate risks to humans, but leave contamination in place for potential impact on biota and elsewhere. For many CS problems, regulators and municipal officials will close off adjacent shallow groundwater wells or surface water intakes, particularly if they serve small private water supplies. In the event of toxin uptake through the food web, fish advisories and fishing bans are implemented on an area by area basis. Beach closures and fencing off the waterfront complete the list of commonly preferred control methods. With the exposure pathways presumably closed and the policy satisfied, the resolution in many cases satisfies the goal of risk reduction to human health and the environment.

3. Property line or jurisdictional problems
   Brownfields and voluntary cleanup programs place great emphasis on cleaning up the actual land that comprises the site. This owes to the emphasis on redevelopment and returning the property to productive, taxable use. However, only in rare brownfield and voluntary cases—in Bellingham, WA, Emeryville, CA, and Portland, OR—have large-scale, area-wide assessment procedures been implemented to address issues outside the property line; specifically, in waterways or aquifers.

   The area-wide concept, however, leads to questions about what constitutes good sediment sampling for an institutionalized property line mentality. The clear answer, barring a stable aquatic environment with minimal chance of contaminant and sediment transport, is that expecting an

The State of Michigan uses the following priorities to recommend assessment and remediation grant funds under the Clean Michigan Initiative:

1. A threat to human health via contact exposure or the municipal water supply.
2. A threat to a sensitive natural resource (defined as game).
3. If the work is part of a wider redevelopment or revitalization project.

Source: http://www.deq.state.mi.us/cal/dq030199.htm#partIII

accurate picture under those constraints is unreasonable. From a legal perspective, since most states claim authority over their surface waters, only the landward soils need be accounted for in private cleanups—so long as contamination traceable to the property does not appear elsewhere during any later assessment work for different reasons. The odds of such assessment work occurring and such a link appearing, given the cost, environmental conditions, and boundaries of a future perceived problem seem slim. The contamination, however, remains in the environment, and is continually added to by pollution from surface runoff and industrial sources.

3a. Public ownership of waterway
Unless the state also owns the waterfront property, an otherwise voluntary program for a private landowner provides no requirement to sample aquatic sediment. The state's only recourse is to reject such a property from the VCP or deny a NFA letter. Some might argue that only select states would pursue this course of action. Typically, the emphasis remains instead on soil and groundwater beneath the property. Only with evidence of groundwater contamination and the potential for subsurface flow into the water body via sediment would such an assessment occur, likely under a different, mandated program. Action of that kind would probably occur only if the contaminated groundwater impacted a water supply or provided some additional threat to human health. In other cases, contamination would likely go unchecked for an indefinite period of time.

3b. Public (city) ownership of property
City ownership of the property may limit liability in some cases; however, the risk of becoming a PRP does not completely disappear—an event that would commit resources most municipalities do not have to the project. In many cases, in the words of a Michigan project manager, "the cities choose to do the easiest sites first and establish a track record, rather than deal with the more complicated properties"[16]. This practice benefits the municipalities by

Table 2. New Orleans Brownfield Project Second Cut Evaluation Criteria - Draft Guideline

Proximity to: (Points)	**Redevelopment Interest**
School (2)	Documented (20)
Park (2)	Not Documented (0)
Residential area (2)	
Commercial area (5)	**Level of Commitment from Prospective Purchaser**
Industrial area (5)	Low level written commitment (0)
Operating business (5)	Mid level commitment with earnest money (5)
	Highest commitment with contingent contract (10)
Level of contamination	
Known high contamination (0)	**Employment Creation**
Probable low level contamination (5)	Potential job opportunities known (10)
Probable little contamination (10)	Potential job opportunities unknown (0)
Ownership of Site	**Number of jobs**
Local government entity (10)	Will create at least 10 new jobs (5)
Private citizen or other (0)	Will create under 100 new jobs (10)
	Will create over 100 new jobs (20)
Owner Interest	
Supports brownfield redevelopment of property (20)	
Opposed to brownfield redevelopment of property (-20)	
Has not responded (0)	

Source: Internal Document: "New Orleans Brownfields Project Second Cut Evaluation Criteria - Guideline For Consortium Weighting." Interoffice Memorandum from Amy Clipp, Deputy Director, New Orleans Mayor's Office of Environmental Affairs (8/27/97).

putting off any liability problems in the water, but leads to questionable prioritizing among land parcels.

Brownfields projects in New Orleans, by no means the only ones to prioritize according to this system, provide some insight through a draft guideline point scale used in 1996. This scale was used to determine which brownfields in the federal pilot would receive funds for an expedited site assessment demonstration. Here, a previous round of ranking reduced the number of properties under consideration from 80 to 30. In this round, the guiding scale emphasis rests primarily on job creation and ease of redevelopment, with the highest-scoring properties generally receiving the greatest priority. One could surmise that the possibility of having to address CS would not assist a property under these criteria.

4. Proximity to ongoing CERCLA investigation

In general, waterfront properties near CERCLA waterway sites—for example, properties bordering Tacoma, Washington's Thea Foss Waterway—have had offshore aqueous sediment evaluated through Superfund. In this way, what would have been a Corps of Engineers responsibility to assess a navigable waterway was covered under another program. However, questions remain for brownfield cases with upstream polluters resembling General Electric's Fort Edwards and Hudson Falls, NY plants, along the Hudson River. Analysis of downstream property owner behavior, if brownfields or VCP sites existed at the time, would prove insightful.

Due to sediment transport, relative location to a water body impacted by a CERCLA site may affect waterfront redevelopment. Under these conditions, disincentives exist for waterfront owners, particularly private owners, to voluntarily characterize their sites. These include:

- Potential identification and liability as a PRP for the waterway
- Potential detection of subsurface contamination transported from other sites (which solves the problem of paying for cleanup but places property out of market for a much longer time scale).
- Cost of characterization and concomitant threat of remediation need

Additionally, investigating offshore carries heavy disincentives depending on the status of the Record of Decision (ROD):

- If a ROD has been signed, any contaminated sediment problems will, in theory, be eliminated by the remediation action. Although this presents a greater risk the further downstream one travels, from a "threat" perspective it solves the immediate problem. This assumes that all PRPs have been identified and that the cleanup is effective. Brownfield and VCP site owners will not and have not investigated adjacent aquatic sediments in these cases as a result.

- If a ROD does not exist, in all likelihood the project remains at the PRP identification and liability stage, or in the characterization phase. Brownfields owners may choose and often have chosen to wait until obligated, or until an agency seeks to assess their area as part of a larger characterization effort. In a larger sense, when a Brownfield owner chooses not to assess *any* media due to a CERCLA threat, a process known as "mothballing" the property occurs, preventing vital redevelopment.

5. Multiple sources and contamination confounding

Aqueous sediment contamination may arise from a variety of sources, including:

- Subsurface plume originating on or off-site
- Groundwater leaching
- Direct discharge from the facility

- Surface runoff from the facility and from higher in the immediate watershed
- Sewage discharges and system overflows
- Transport from upstream sources
- Other water column sources, including the settling of particulate matter from the air and discharges from vessels.

For these reasons, characterizing and assigning liability to the comparatively small share of sediment contamination that may arise from a single waterfront brownfield exceeds the scope of most state and local enforcement agencies. The cost of attempting to do so might well exceed the amount reclaimed. Additionally, other priorities clearly supersede it at the national agency level.

Yet without question, CS remains a problem in the nation's waterways that comprehensive liability laws struggle with, due to the lengthy process of identifying responsible parties. Under WRDA 92, the EPA's National Sediment Inventory identified 96 watersheds in the U.S. as areas of probable concern, where 75% or more of the sediment sampling stations indicated toxicity levels that posed at least some risk to human health[17]. This round of sediment sampling, the most extensive ever performed in the U.S., will have to be followed by additional sampling, though, to adequately characterize the problems and identify the highest priorities for cleanup within a watershed. For many locations, the waterfront voluntary setting—in cooperation with outside funding sources—may provide the only opportunity for such work in the near future.

2.1a Driving mechanisms for assessment

Brannon and McFarland (1996) identify three mechanisms driving sediment evaluation: impacts of dredged navigation channel sediments; environmental and human health impacts of existing undisturbed sediments versus natural recovery (usually in the context of an existing project for an identified location); and source identification and control[18]. These, together with a few other forces, comprise the primary institutional incentives to test for CS today. Other forces include spills or excessive releases from permitted facilities, sudden human health impacts, and reporting of abnormal conditions by outside parties.

With the exception of preventative source control, none of the above mechanisms causes a state or other agency, to go out and "look" for or at new CS. The CS at Black Lagoon, for the Detroit River/Trenton Channel beneficial reuse demonstration project, was discovered when a child experienced detrimental health effects and skin damage after walking in the water[19]. To this day, no viable PRP exists in the area, despite the heavy industrial footprint along the river and extensive ongoing mapping of CS in other river sections before the Black Lagoon discovery. This illustrates not negligence on the part of the agencies involved, but rather the limitations of science when asked to perform the difficult task of PRP identification and differentiation for a common resource with multiple pollution sources. The liability law imposes an incredible scientific burden to drive cost recovery; a burden which may be more easily met for some contaminants and some cases than others.

The result is the unfortunate situation of streams, rivers, lakes, bays, and other common waterways impacted by hundreds or thousands of point and non-point contaminant sources, with no means other than scarce, government-funded source control or baseline sediment mapping inventories to further characterize most of them. Although the most serious problems will ideally be addressed by the liability law and navigational dredging by the Corps (as industry tends to concentrate around navigable waterways), the time scale of the law and the lack of funded source control represented by these approaches will still leave future problems. Additionally, the assessment funding provided by navigation and USACE waterfront redevelopment projects is tied to a remediation method — dredging[20].

For the remaining waterways, the potential CS problem remains largely uncharacterized and growing, though with less toxicity than in previous decades. An areawide, watershed-based assessment approach provides the best hope of addressing source control and determining where "hot spots" exist. It would also enable the EPA to make more judicious applications of the liability law, while truly solving contamination problems over the long term. In this sense, the Clean Michigan Initiative represents an epic shift in state-federal mindset and responsibility, where a state has volunteered to fund CS remediation in nine non-Superfund designated waterways, while retaining the right to pursue cost recovery against identifiable PRPs[21].

As stated above, however, the voluntary or brownfield approach seems inadequate to address the problem by itself. The liability scheme, for its part, faces its own challenges, as the National Research Council notes that "it can take up to 15 years or more before a management strategy is put into place"[22]. Even under sediment cleanup standards, discerning responsible parties and determining investigation priorities will probably not lead to efficient cost recovery. In the meantime, CS continues to accumulate and impact the environment, though perhaps on a slightly smaller scale than before, with constant transport throughout the aquatic ecosystem.

2.2 Additional funding mechanisms to drive sediment assessment

To address the problem, local, state and federal agencies have had to shoulder an additional part of the cost recovery burden. However, by forming consortiums with private stakeholders in the waterfront voluntary setting, some groups have been able to address area-wide contamination problems and may recover, in the long run, some tax income that they may have lost by waiting for a 100%-liability based CS cleanup. Arguments will abound on all sides concerning whether or not the states, in particular, have the resources, cleanup and monitoring standards, and moral obligation to pursue this course[23]. Nevertheless, funding sources do exist for those willing to pursue area-wide cooperation.

2.2a Navigation projects and beneficial reuse of sediment

> U.S. Army Corps of Engineers (USACE)—Waterways Engineering Station, Vicksburg, MS <http://www.wes.army.mil/>

Navigable rivers and harbors tend to absorb the bulk of CS contamination, due to contaminant transport and industry concentration around these areas. A primary mission of the US Army Corps of Engineers involves developing and maintaining the navigable channels for these waterways. Because it lacks a line item in the federal budget, the Corps remains dependent on local representatives and other government agencies for work. It estimates that 5 - 10% of sediment in such channels is unsuitable for open water disposal under the Code of Federal Regulations (CFR)[24]. To solve this problem, USACE must theoretically use the least costly approach that complies with disposal regulations. Contracting parties must handle costs above and beyond that, though many cases cast doubt on the severity of that mandate[25]. The NRC recommends altering the policy for good to emphasize beneficial sediment reuse, because current government policy pays for risky open-water but not landward or beneficial disposal, an obvious disincentive to sponsors[26].

The Corps has the authority under WRDA to clean upland properties if contamination migrates from them and impacts a navigable waterway, and brownfields provide suitable locations for beneficial reuse. Typically the sediment in the deep navigable channel does not pose a hazard—most contamination instead appears on the wings of the waterway. Therefore, clean or treated sediment dredged from the channel can cap *landward* soil contamination on waterfront brownfields, freeing them for reuse. One problem still under investigation, however, is that of microbes and contaminants in *untreated* fill sediments potentially entering the lungs via aerial exposure pathways.

This approach also leaves the problem sediment outside the channel unaddressed, since the work pattern has evolved this way over time, but the Corps has an interest in attacking that sediment as well. It could accomplish this by joining cooperative efforts, just as it invested heavily in cooperative beneficial reuse research when the number of available CDFs and CADFs began to shrink. Under WRDA, the Corps may dredge outside of the navigable channel to remove CS in other parts of the waterway. Though it has never used this power, cost sharing provisions might make it an attractive option to a port authority and/or state agency.

When the Corps does upland brownfield work for ports and cities, the cost sharing parameters make its involvement much easier than contracting privately, at least in the assessment phase, where the Corps only requires a municipality to cover 50% of the price. However, federal Brownfields pilot funds may not be used to pay the Corps, and additional work—costly if not accounted for in the federal budget—requires 100% funding by the client. Still, covering the upland assessments—which may comprise between 40 and 70% of brownfield redevelopment costs—would remove a sizable burden from municipal redevelopment agencies. Then, under an area-wide model, the Corps could re-enter the water and perform needed CS work and channel maintenance with a federal appropriation.

Recently, Dr. Tommy Myers of the USACE undertook a survey to gauge the demand for beneficial reuse of sediment on waterfront brownfields. Of 60 surveys sent out to ports and harbors around the United States, Myers received 20 responses—consistent with an earlier response that American Association of Port Authorities received when it queried its predominantly deepwater membership about brownfield redevelopment demand. Respondents, Myers notes, likely know of—or highly suspect—CS problems in their waterways, and seek assistance in balancing their desire for dredging and port expansion with the need to address contamination. With the prospect of EPA sediment standards, the Corps may investigate the possibility of a national sediment work strategy, with Congressional authorization and funding.

Finally, the Corps conducts research into field screening and assessment technologies for sediment, which are discussed later in this document, and will need demonstration projects in the future.

2.2b Loans and grants

From an area-wide problem-solving perspective, a loan may provide the resources, but forming a public-private coalition with landowners will prove difficult if they will have to help repay the loan. This approach would only appear attractive if the landowners knew they might face CERCLA liability for impacting a common resource. In the waterfront setting, just such a complication arises when one considers the possibility of contamination not only in landward soils, but in adjacent aqueous sediment as well. Therefore, cooperative agreements among multiple stakeholders that cut across regulatory programs and interests—most often navigation, voluntary cleanup, brownfields, and mandated or liability-driven actions—have proven quite successful at securing funding. The key to effectively utilizing a loan approach likely involves a combination with grants or

Table 3. Survey conducted by Dr. Tommy Myers, USACE-WES, under Section 212 of WRDA 96

Statement 1: Contaminated sediments are a serious problem that impedes maintenance and development of port infrastructure. Indicate and Comment: Strongly Agree/Agree/Neither/Disagree/Strongly Disagree
Statement 2: Significant opportunities exist for coupling contaminated sediment remediation with waterfront brownfields redevelopment. Indicate and Comment: Strongly Agree/Agree/Neither/Disagree/Strongly Disagree

other funded projects at the state or federal level. This allows the consortium to address multiple area-wide contamination concerns, particularly regarding upland sources and impacts on wildlife. To property owners nervous about investigating their land, such grants and projects indicate a commitment to solving overall environmental problems rather than simply forcing PRPs to assume costs for a sediment project with an indeterminate scope. This is not to say that the PRPs have to "get away" with their pollution for the cooperation to work. In Bellingham, for instance, Washington's Department of Ecology conducts ongoing State Superfund work in a region that has been well mapped for CS for many years. There, Ecology addresses the most severely affected area—the Whatcom Waterway—through Superfund, while its grant-funded consortium with the Port of Bellingham addresses CS in the inner bay. Additional upland voluntary cleanups in conjunction with CS remediation would also recover some costs for the state.

As stated above, the federal Brownfields Initiative, along with most states, provides Revolving Loan Funds (RLFs) <http://www.epa.gov/swerosps/bf/rlflocat.htm>. Other loan opportunities are available at the state and federal level, however, and one with particular importance for CS and brownfields may expand in the near future.

The Clean Water State Revolving Fund (CWSRF) takes in state and federal contributions, and then pays out low or no-interest loans for water quality projects. Each state, as well as Puerto Rico, has a CWSRF program linked to the fund. Currently, it holds over $27 billion in assets, providing about $3 billion worth of water project support annually[27].

For brownfields, the CWSRF can fund projects that would mitigate or even eliminate aqueous sediment pollution problems. According to a recent memo, CWSRF funds could cover at least the following tasks[28]:

- excavation and disposal of USTs
- constructing wetlands as a filtering mechanism
- capping of wells, well abandonment
- excavation, removal, and disposal of contaminated soil or sediments (presumably in situ methods are covered as well)
- tunnel demolition
- phase I, II, and III assessments

Although the states determine project eligibility on an individual basis, most likely anyone qualifying for a VCP program will also qualify for CWSRF funds. The terms of the loan could provide a much needed incentive for waterfront brownfield owners to assess and clean up aqueous sediment, particularly if the owner is a municipality seeking to address wider water quality issues. In some cases, CWSRF proponents note that a loan may provide a better deal than a grant that requires cost sharing[29].

In addition, the Administration proposes to earmark 20% of CWSRF funds in its FY 2000 budget for "non-point source and estuary project grants." With a budget request of $800 million, this could amount to approximately $157 million in grants. On an individual project, these grants could cover 60% of the costs, with the remaining 40% paid by a no-interest CWSRF loan or other specified financing sources[30].

2.3 Post-characterization risk assessment for sediment

Risk analysis rests at the core of CS problems, due to their widespread nature. For many sites, although contamination may spread throughout a waterway, removal or treatment of all CS is both impractical and unnecessary. Under such procedures, low-level pollution may accumulate or have uncertain impacts on the environment and go both unassessed and unremediated due to a lack of distinguishable PRPs and direct threats to human health. Such questions, however, address matters of responsibility and cost recovery, and the fact they remain unresolved to this day emphasizes how a risk-based approach has helped to expedite the actual cleanup process while the debate continues.

For CS, risk and cost/benefit analysis channels resources toward greatest efficiency in the remediation phase. Smaller, high-risk "hot spots" may require more expensive and more

complicated solutions; larger, low-risk areas often allow for less expensive methods or natural recovery. The NRC notes, however, that more risk and cost benefit analysis needs to address "risks of sediment removal or relocation or the risks remaining after remediation"[31].

While diminishing returns serves as the law of risk analysis, quality standards used to evaluate those risks "have not been linked quantitatively to ecological or human health risks," the NRC states[32]. From a policy perspective, the preventative principle should drive such decisions; however, the NRC statement gives powerful ammunition to those with an incentive to oppose sediment quality standards out of liability fears. If EPA attempted to promulgate such standards without Congressional authority, it face a legal conflict similar to its Clean Air Act air quality standard revisions, recently struck down by a Federal District Appeals Court[33].

2.4 Potential impact of prospective EPA Contaminated Sediment Standards on assessment

What level of risk, though, translates into a quantifiable standard that determines the next step in the cleanup process? As stated earlier, the waterfront voluntary setting provides, in many cases, the only near-term opportunity for sediment assessment in a municipality. Unfortunately, under the present system, assessing CS responsibility without an imminent threat to human health proves difficult—which means that costs of proceeding further cannot be recovered. With the EPA pursuing maximum toxicity standards for sediment, the question of payment for assessment and cleanup has the potential for increasing legal conflict, depending on the rigor of the standards. However, the end result could provide a better benchmark to determine the need for and success of CS cleanups. Projects to date have tended to address toxic "spot contamination" already in place, rather than genuinely addressing issues throughout the watershed, such as surface runoff, because non-NPL CERCLA cleanups lack that authority[34]. Again, the question becomes one of funding, in this case, money that the liability law does not allocate for such preventative purposes.

Any new sediment standards will strongly drive technology use in the aquatic environment. Under such regulations, sampling tools would have to meet stricter data quality objectives for the quality criteria contaminants, although sediment usually contains multiple contaminants that the criteria might or might not cover.

Currently, dredging or grab sampling from the top of sediment layers risks cross-contamination and remains subject to forces in the water column. It also ignores leaching and does not provide indication of contamination depth. The much more common coring techniques usually have limited core lengths and unrepresentative interior diameters, also making it harder to collect a high quality sample. Furthermore, the NRC labels coring as "slow and expensive," and, depending on site-specific conditions, as "provid[ing] limited spatial resolution"[35]. Fortunately, on the assessment side, although this report uncovered no full-scale field screening or on-site analysis applications for aquatic CS, better versions of the core samplers themselves will enter the market soon. Combined with the wide range of bench-scale screening technologies and improving lab analysis instruments, at least the cost of assessment will fall, while its effectiveness rises.

2.5 Emerging field screening and sampling technology for CS

Rapid Sediment Screens, developed and tested by the USACE, could save money and provide a more accurate description of the contamination zone for CS. Though the technology relies on an extraction step that must occur in a lab, it still saves money by signaling non-detect samples, providing a chance for additional coring near positively identified contamination. Like most screening technologies, the methods work only for single sediment contaminants (i.e., biomarkers for dioxin in CS), and, unfortunately, their use remains unacceptable under CFR. The Corps has also expressed concerns about its ability to transfer sediment screening technologies from its labs, and would do well to

follow the example <http://www.greenstart.org/efc9/reports /id9_m.htm> set by the Bay Area National Laboratories and the Region 9 Environmental Finance Center[36].

The AMS Split Core Sampler <http://www.ams-samplers.com/> for Submerged Sediments, recently demonstrated under the SITE Monitoring and Measuring Technology program, collects cylindrical cores to a maximum depth of 36 inches below the surface. AMS created the tool by modifying its existing Split Core Sampler for soils. Two key differences between its design and that of conventional sediment corers allow it to provide a higher quality sample. A ball check valve in the top cap allows water to exit during submersion and creates a vacuum to hold sediment in during retrieval. The modified coring tip contains a basket retainer to hold sediment within the interlocking split core cups. AMS hopes that these modifications will address concerns about conventional coring and lead to more sampling of undisturbed zones not sampled through grabs or dredging. For more information, see the Contacts table or SITE Program Demonstration Bulletin EPA/600/F-99/008.

The ARI Russian Peat Borer <http://www.aquaticresearch.com/sediment.htm>, originally used for collecting microorganisms in pond sediment, was also recently demonstrated under the SITE program. Along with the AMS Sampler, it successfully collected PCB and arsenic impacted sediments from the Fox River and Dothan Park in Wisconsin and Mystic Lake and Woburn in Massachusetts. The Peat Borer can operate in water depths up to 15 feet, and can collect samples as large as one liter as far down as 65 feet below sediment surface. Borer materials are lightweight, durable, corrosion resistant, and strong. Used in parallel, two borers provide a complete, continuous sediment core, with little surface disturbance and no sediment entry during the driving process. For more information, see the Contacts table or SITE Program Demonstration Bulletin EPA/600/F-99/008.

3. Current Application of Innovative Characterization Technology at Waterfront Voluntary Sites

3.1 Methods of data collection

Site specific information

To gather site-specific technology application data on brownfields and VCP properties, one must rely almost exclusively on intra-governmental documentation and chain-of-command interviewing. Factors limiting the effectiveness of this approach include time, resources, and access to the decision-makers involved.

Unlike Superfund and RCRA, brownfields technology use for both characterization and remediation is generally not subject to documentation requirements. Public records of

NRC Report <http://www.nap.edu/catalog/5292.html> comments on site characterization needs for CS

Problems
- Accurate characterization essential for cost effective CS management and risk assessment (p. 8)
- High cost limits precision of defined CS zones; impacts remediation work (p. 9)

Recommendations
- With more research, acoustic profiling may provide for cost effective remote surveying with high precision (p. 9)
- Chemical sensors may work for sediment as they have in soil and groundwater (p. 9)
- "Improved site assessment capabilities need to be developed and implemented to enhance overall cost effectiveness" (p. 169)
- "The EPA and USACE should conduct joint research and development projects to advance the state of the art in site assessment technologies." (p. 172)

decision (RODs) do not exist for these projects, and EPA headquarters does not keep regular tabs on individual federal pilots. Most of that information resides at the regional level of the Agency or with individual project managers. While state VCPs must track individual parcels by the nature of their programs, most do not track technology use. Finally, large amounts of information remain confidential to non-agency and non-government employees.

Therefore, access to documentation on technology use largely depends upon the lead agency and the researcher's relationship to it. The following points summarize the common information access paths used in this report:

3.1a National Brownfields Assessment Pilot (Federal Pilot) properties

- Organization: At the EPA's regional level, a Brownfields team operates out of the main office, under the Superfund program. For each region, one person serves as the Regional Brownfields Coordinator. However, this person tends to have limited or focused day to day work with individual pilot management. Depending on the region and the municipality receiving the grant, project managers will oversee a particular pilot locally or from the main office. Main office oversight remains more common, as managers are often charged with overseeing several pilots in multiple states at one time. In some cases, however, the EPA has found it more efficient to hire a liaison locally to coordinate the pilot, typically when municipalities lack other support agencies to fill that need.

- Reporting Requirements: Local government contacts must file quarterly reports to the EPA regions, but these reports seldom, if ever, contain technical information. Instead, they tend to reflect the focus of their writers as "process intensive," since the bulk of Brownfields grant funds are provided for the purpose of coalition-building, education, and leveraging future cleanups. Additionally, some regions have been slow to press for this information. The lack of technical information contained, however, appears only to parallel the aversion of "process" types to such material, since no policy mandates the report's content.

- Federal Documentation Sources: Record keeping methods vary widely among the pilots and regions, complicated further by state-federal and municipal-federal control issues. For a property targeted under the pilot, access to technical information typically runs through the regional project manager.

- Local Documentation Sources: In many more cases, however, property is municipally owned, so local governments will keep additional records and take the lead on the project. In this situation, cities will contract out to engineering firms, sometimes with more technical (city engineer) staff serving as contacts. Often, however, a city will have only an economic development agency representing it in the redevelopment process, with all technical services contracted out. This does not mean that the city or redevelopment agency lacks such records on the project. It does, however, tend to signify that efficient retrieval of this information, short of personal visits to sift through files, is better left to the engineering firm contact. Therefore, despite the federal nature of the pilot, the only easily accessible records may rest with a private firm—a more efficient yet harder to track approach.

3.1b State voluntary cleanup and brownfields programs

- Organization: As with the federal Brownfields program, state VCP and Brownfields programs usually run under the state's Superfund program. Management and resource commitments vary widely among states, but project managers typically handle more cases than feasible and cannot commit large portions of time to investigating or advocating innovative technologies.

- Reporting requirements: Again, these vary among states. Theoretically, for the EPA to issue a NFA letter, and for the state to declare closure, an assessment report must be generated. This leads to the question of document repositories and sources. The most efficient means of storing this data would be in a publicly available database, which a few states have begun placing online. Still though, many states do not include assessment information (other than phase I-II-III progress) in these databases or GIS sources. The recently published Kensington Report provides the best available contact info for state brownfield and VCP programs, as well as their databases[37].

- State documentation sources: Given the large legal ramifications of site characterization conducted under a VCP or brownfields program, results should remain in the public record within the state agency responsible. Finding this information, however, demands time and persistence. In many cases, documentation on site characterization tools and methods may not exist within the state agency (see below), but instead with local governments.

- Local documentation sources: Reporting requirements depend on contamination. In some states, when contamination does not reach a further action level, reporting on technical details like characterization tools may stop at the agency-regional, county or city level. This level of recording would be almost impossible to survey on a national scale, and, as above, contracting firms may provide the most efficient means of access.

- Hazards: Since the state rarely has the resources necessary to provide comprehensive oversight, it is often left to the firm to 1) provide the range of technology alternatives, and 2) to self-police and ensure that the tools are used correctly. The first tendency presents a hazard because the firm may artificially limit choices to excessively complex sampling plans, to conventional tools already at its disposal, and to higher cost options than necessary. Despite competitive bidding procedures, this information may be lost on or unavailable to local decision-makers. The second tendency also presents a hazard, because firms may promise widespread application of innovative tools to cut costs in the bidding process, but then perform shoddy work due to field problems or poor planning.

3.1c General exceptions and advisories for data collection

Since characterization and remediation phases are usually bid separately, this creates the possibility of two or more firms holding information on a single redevelopment project. Fortunately, the remediation contractor ends up with data from the assessors, and may obtain reports from surrounding properties depending on the requirements and professional quality of the job. If, however, the property is under consideration for mandated corrective action, assessment contractors usually will not share characterization information for confidentiality reasons.

3.2 Decision making in the characterization tool selection process

The final decision to use field portable technologies in the voluntary setting usually rests with the agency project manager, who usually relies on the consulting engineer. This reliance may manifest itself in an "enhanced review process," but no amount of streamlining will compensate for an overly rigid policy that hinders field tool application. The several sets of factors noted above constantly impact, dilute authority among, and affect the decision-making within this relationship. The overall approach presents several problems.

First, the project manager is often over-reliant on the engineer. Workload and lack of technical expertise, as well as hesitancy to deviate from standard procedure, causes the agency representative to assume an approve/disapprove posture. If the consulting engineers can show that their sampling plan

meets agency policy requirements, regardless of whether or not it may provide the best quality, most efficient, or most appropriate data, then it satisfies the firm's burden. Keep in mind that data quality objectives or other means to ensure quality control are relatively new to some states.

From a documentation perspective, the process of devising a characterization plan and selecting tools and technology remains relatively opaque. Some observers at the federal level have noted that the informational and creative burden on the firm not only proves efficient amidst limited agency resources, but helps deflect accountability as well. Any mistake or undetected contamination becomes the fault of the contractor.

The firm, which may have its own motives and those of its voluntarily acting client to contend with, is left to advocate its plan before the regulators (known as "providing a deliverable"). Unfortunately, some firms hesitate to apply innovative characterization technologies, either due to poor cost/benefit information for the client or an uncertain performance perception. Without an open policy that efficiently permits and effectively promotes innovative alternatives from the start, the state regulators will end up approving plans that meet their conventional sampling criteria. Less than effective and less than efficient site characterization results from this cycle, particularly in light of the unique needs of waterfront property and brownfields stakeholders.

Agency attempts to push an innovative technology at the approval stage—with inadequate resources to review each plan, select the proper technologies, and incorporate data quality objectives that may not have been designed with innovative tools in mind—would only draw out the process and alienate VCP participants. Unfortunately, in the voluntary and brownfield process, most states do not get involved until this point, leaving the assessment work to the client and firm. This places the burden on them to step forward and "claim" a status for their property, whereupon the state determines the necessity of and verifies cleanup actions.

3.3 Baseline assumptions

Due to this market's preferences noted above, and despite state pressures, field portable tools should theoretically appear frequently throughout the dataset. Longtime observers of brownfields and the environmental assessment technology market, however, know all too well the problems with the above statement. These problems include overly rigid state policies regarding innovative technology, as well as traditional obstacles noted in Section 1.6. Because of the national nature of this project, it seems futile to explicitly predict if field-based characterization tools will experience more or less application than conventional tools. The distribution and concentration of sites among the states would skew the data and mask the large impact of state agency policies on sediment assessment and technology use. Without explicitly comparing every state and EPA regional policy, it remains difficult to predict whether the pilot sites or VCP sites will exhibit greater use of these tools.

The voluntary waterfront redevelopment setting, with its tight budgets and short time frames, lacks tolerance for technical mistakes. Therefore, the data on innovative characterization tool application for this setting should support a few conclusions:

1. Any innovative characterization technology used should have available cost and performance data for the suspected contaminants involved. No site will try a tool straight out of the lab.

2. Field screening technologies will see far greater deployment than on-site analysis tools, as on-site analysis has yet to gain the widespread acceptance of screening tools, both among firms and states.

3. Sampling of aqueous sediment will only occur if a state or local agency has employed an area-wide approach to characterization, for the purpose of examining groundwater issues or for identification of PRPs under a potential state or federal Superfund scenario. No

other regulatory incentive, aside from USACE dredging, compels an agency to examine aqueous sediment for waterfront voluntary or brownfield properties.

3.4 Results

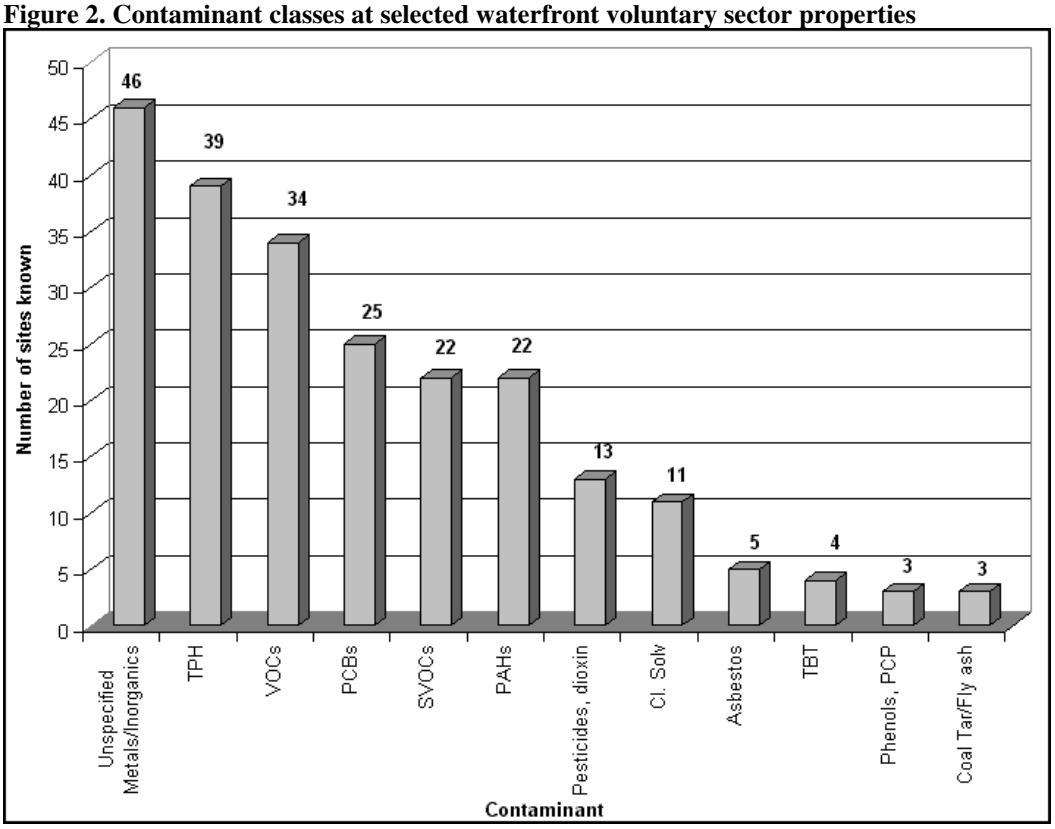
A large percentage of information in the data tables, specifically the Contact data tables, contain hyperlinks to web pages or email. This was by design, as the data tables are meant to serve as a resource for researchers in addition to simply providing information for this project. A stable dataset compiled over time is necessary to both accurately gauge progress and identify problem areas with voluntary cleanup programs. For our waterfront subset, it provides the opportunity to test the impact of various policy programs, redevelopment theories, and political proposals. With finer examination, it also shows a great deal about the organizational structure behind implementing these programs, how it works, and where connections need to be made or strengthened. More work needs to be done, and with scarce information on site specifics for the voluntary market, these tables represent a starting point that researchers will hopefully build on, cite, and communicate their ideas with.

Data collected directly support assumptions one and two, and with few exceptions, also support the third assumption.

Data Tables (Appendix A): Data Matrix, Contact List, and data tables for 115 sites on the following topics: Oversight, Progress, Field Tool Application, Contaminants, Remediation, Sediment Assessment, and proximity to NPL.

A large percentage of information in the data tables, specifically the Contact data tables, contain hyperlinks to web pages or email. This was by design, as the data tables are meant to serve as a resource for researchers in addition to simply providing information for this project. More work needs to be done, and with scarce information on site specifics for the voluntary market, these tables represent a starting point

Figure 2. Contaminant classes at selected waterfront voluntary sector properties



that researchers will hopefully build on, cite, and communicate their ideas with.

Site selection
Waterfront location was the primary criteria for site inclusion. Secondary criteria included planned or completed work and identification as a targeted property under a Brownfield pilot. Inclusion was slightly biased to collect as much information about properties that had completed phase II work in as short a time as possible. Since properties were followed up on immediately once identified—the dataset had to be created from scratch within a 12-week time constraint—it seems obvious that waterfront sites with complete site characterizations would prove of more interest than those without. For that reason, this paper does not provide a nationwide "universal status report" on all waterfront voluntary properties.

Contacts
Most information for this project was collected over the phone or via email. The idea of voluntary submission via a web-based form, database, and possibly GIS seemed appealing; however, the State of Pennsylvania has tried exactly this approach for gathering less technical information than contained in this report. Their result, 21 sites, has been supported by a grant program that pays local government entities $1,000 per brownfield they submit to the voluntary database[38].

At the time this project began, the EPA volunteered no centralized nationwide contact list for brownfields project managers, and one may not exist. Contacts listed on the scant fact sheets were at times out of date and rarely the best persons for the information sought here. Nearly all of the site contacts listed with this report were contacted over the phone and/or via email. As this was in some ways an on-the-job learning process, there were no "standardized" questions, though certain topic headings always were covered depending on the contact's expertise and access to relevant site information—these comprise the data tables. A fair amount of information not included in this report was also collected, as project managers and engineers tend to relate background knowledge and unique challenges facing their sites as well.

Below the site contacts are a list of other contacts, all experts in their particular field whose insight was invaluable in shaping portions of this report. The contacts file also includes a linked list of online state databases explicitly containing or searchable for voluntary properties. One of the major drawbacks of the Kensington Report was its failure to include a list similar to this. Finally, the contacts file concludes with contact info for firms and others that deal extensively with voluntary industrial cleanups.

Progress
One large drawback with this table involved groundwater testing; because the project's intent focused on obtaining information field-based characterization tools, some sites focused their information-providing efforts on soils and sediments. Though data gaps exist with regard to media, it seems clear from industry protocol that the vast majority of sites that have sampled soils have probably also sampled their groundwater. With additional time, a firmer correlative link could have been established between sites sampling (or not sampling) groundwater and sites sampling (or not sampling) sediment. In this way, analysis of the groundwater leaching contaminant pathway could occur.

Field-portable tool application frequency
Clearly, from the descriptions above, determining a progress of a site proved many orders of magnitude easier than accessing field tool information. However, 21 sites did apply field-portable screening or analysis technology, and an additional five used only Geoprobe or direct push methods, which still fit the definition of field tools despite their non-innovative qualities and established market position.

Among the sites applying innovative methods, handheld photoionization devices (PIDs) and soil gas samplers, both screening tools used to better define regions of contamination, were the most common choices. A total of 15 PIDs, used mainly to detect VOCs, and six soil gas

samplers, were employed. Four sites chose to use on-site labs, including one private site outside of the New Orleans federally funded demonstration, a former explosives plant in DuPont, Washington. The Navy, with its sizable in-house research division, has taken the lead in applying innovative field technologies to its sites—though even under base-closure conditions, it operates under a different set of funding and market parameters.

In time, additional follow-ups or data contributions will allow us to obtain a more accurate picture of exactly how many sites nationwide employ field tools and for which purposes (screening or analysis). For now, due to state policies and communication gaps regarding on-site analysis' reliability, screening tools experience far more widespread application. Screening frequency with the tools noted is consistent with the high number of sites reporting VOCs, though the high number of sites reporting heavy metals would lead one to expect high frequency in XRF application as well, to counter the large cost of soil removal. XRF, however, saw rather limited application in the waterfront voluntary setting.

Contaminants

No particular type of waterfront industry was targeted by this report; as a result, the dataset reflects a wide variety of contaminant classes from many different industrial and, at times, non-industrial sources. The most prevalent contaminants in sediments, however, included traditionally common materials such as PCBs, PAHs, pesticides (dioxin in particular). VOCs, metals, and TPH were the dominant contaminant classes in landward soils. Where groundwater information was available, TPH appeared to be the primary contaminant.

Remediation

A few innovative remediation projects eventually appeared among the 115 sites. As one can determine by comparing the number of phase II completions to the number of completed remedial projects, however, most voluntary and brownfield projects that might take advantage of such technologies have not yet reached this stage. Presently, two conventional SVE projects, as well as one combined bioremediation and thermal desorption project, are operating in Portland, Oregon. Several natural remedies provide hope for cost-effective, low-impact solutions on the horizon—plans for wetlands at Pittsburgh's Duquesne Slag, and plans for phytoremediation at Brownfields pilots in Danbury, CT and Hennepin County, MN.

Sediments

The sediment data makes clear that CS assessment is, in most voluntary cases, directly supported by a public funding source. This is consistent with its status as a common resource and the lack of a viable cost recovery option through the liability law, for reasons cited in Section 2. The vast majority of properties with known sediment assessment work accomplished it through a CERCLA investigation (13) or with assistance from the USACE (8). The two Danbury properties, the Stockton property, and the Pittsburgh property had municipal assistance with the cost recovery. The Harlan, OR and White City, OR properties participated in a Targeted Brownfields Assessment sponsored by EPA Region 10. The two Bellingham properties were part of an innovative partnership that seeks to address CS and other pollution issues surrounding Bellingham Bay. One site has applied for state funding. Only two properties uncovered in this report—ASARCO in Omaha and the Lake Union Steam Plant in Seattle—show evidence of voluntary, privately funded sediment assessment work.

As for the sites that did not assess, some had their reasons. The New Orleans Brownfields pilot, for instance, suspected only TPH in the groundwater at its sites, based on earlier phase I information[39]. Pacific Bell Park in San Francisco, although built on a waterfront site with an industrial past, needed only to address lead contamination associated with fill material in the soil. Other sites, like those in St. Joseph, MI, await funding from state and federal sources. Still others, like the properties in Channelview, TX or Shreveport, LA, were not part of a wider redevelopment plan or cooperative partnership similar to St. Joseph's, and therefore had no incentive to investigate

what is likely an extensive multiple source CS problem in their heavily industrialized areas.

3.5 Cases

Due to the variety of field-based characterization tool application found in this report, as well as the divergent needs of environmental professionals, those seeking further background for case studies should consult the dataset (Appendix A) and contact the sites of interest to them. In addition, it would be advisable to note the future research needs listed in Section 3.6. Case studies were compiled for sites that addressed area-wide concerns (most often CS), because of the potential market for field-portable sediment assessment tools and the ability of cooperative partnerships to expedite assessment while confronting multiple environmental and financial issues.

Confronting area-wide concerns

Bellingham, WA
<http://www.portofbellingham.com/environment>
A cooperative partnership in Bellingham, Washington has provided an example of how area-wide sediment assessment might occur under the current regulatory framework. A 3-year effort among 14 state and federal government and industry partners has recently produced a draft EIS identifying sediment cleanup alternatives for Bellingham Bay. Included in the partnership are several industries responsible for sediment pollution in the bay, including Georgia Pacific West.

The partnership seeks to streamline the necessary sediment cleanup, but also address wider issues associated with the health of the bay. These issues include source control, habitat restoration, and plans for future surface water and shoreline land use.

Under a CERCLA-mandated cleanup decision, sediment problems would eventually be addressed, although wider watershed concerns might not. The advantage of PRP liability would reimburse taxpayers, but probably over a longer time frame. The Bellingham Bay partnership provides a way to address aquatic sediment problems more quickly by supplying the most important element needed for sediment assessment—a secure source of funding. For this pilot project, a variety of agencies, including EPA and the Washington State Department of Ecology, provided grants.

It should also be noted that one shoreline property—the Olivine Property—had sediment assessment undertaken for in water construction at a Coast Guard base. The Coast Guard paid for the work on that project, and is also a member of the Bay partnership.

Significantly, Washington State remains one of the only states with sediment quality standards. Projects like the one in Bellingham Bay may illustrate how such standards lead to addressing wider watershed environmental problems. From a decision making perspective, Ecology knew that bay sediments were likely contaminated with a variety of contaminants from several sources—and that some areas probably exceeded the standards. Community support for rehabilitating the waterfront and preserving existing employment opportunities was strong; however, the process driver—environmental assessment to determine what actions were needed—was missing until Ecology stepped forward with the grant. Both the Bellingham Bay Demonstration and the Bellingham EPA Brownfields Pilot have been notable for their public and private stakeholder involvement. As a result of this cooperation, sediment assessment was conducted in less time than on average, and necessary cleanup to a defined standard will commence soon. When the sediment project and Brownfields pilot conclude, the wider bay ecosystem will fare much better than it has over the past half-century and the city will have a cleaner, revitalized waterfront.

The only limitation on this type of cooperative agreement remains the policy question of having the taxpayers assume the burden for pollution caused by a multitude of responsible parties, only some of which the liability process can identify and distinguish relative culpability among. In terms of end results, however, the Bellingham project, by addressing shared concerns and multiple interests—from wildlife

to redevelopment—has produced an effective model.

Seattle, WA—Multi-User Disposal Sites (MUDS)
<http://www.wa.gov/ecology/sea/smu/muds.htm>
Another innovative sediment project from Washington's Department of Ecology involves disposal sites for dredged material. The Seattle office of the USACE is working with EPA and Ecology to study aquatic, nearshore (cap/fill), and upland disposal sites. USACE has particular interest in this project since, as discussed above, it has wide authority to address CS in and around navigable waters. The most innovative part of the project, however, allows both public and private dredging projects to use and pay for the disposal sites. Though the overall financing and cost sharing requires more discussion, the concept of establishing a permanent, safe, and accessible disposal option looks promising. Though in situ treatment would provide a more guaranteed environmental outcome (rather than transporting the problem and dealing with dredging's inadequacies), it remains undesirable from a cost, permitting, and practicability standpoint for multiple stakeholders. For the present needs of the area, which involve known CS and needed—perhaps even mandated—dredging, the MUDS project appears appropriate.

Emeryville, CA—Soil and Groundwater
<http://209.150.161.6/emeryville>
Emeryville has undertaken an area-wide approach to assessing soil and groundwater by sampling and monitoring throughout the city and the near-shore region of San Francisco Bay. Though comprehensive sediment assessment did not occur, near-shore groundwater monitoring well and grab samples were taken to determine if contaminated water might threaten the Bay. Because of the large number of brownfields and potential contamination sources, transcending the property line approach was made easier in this case. However, aquifers are always common property resources that transcend property boundaries, and Emeryville's willingness to take the area-wide approach illustrates once again the driving forces behind environmental cleanup.

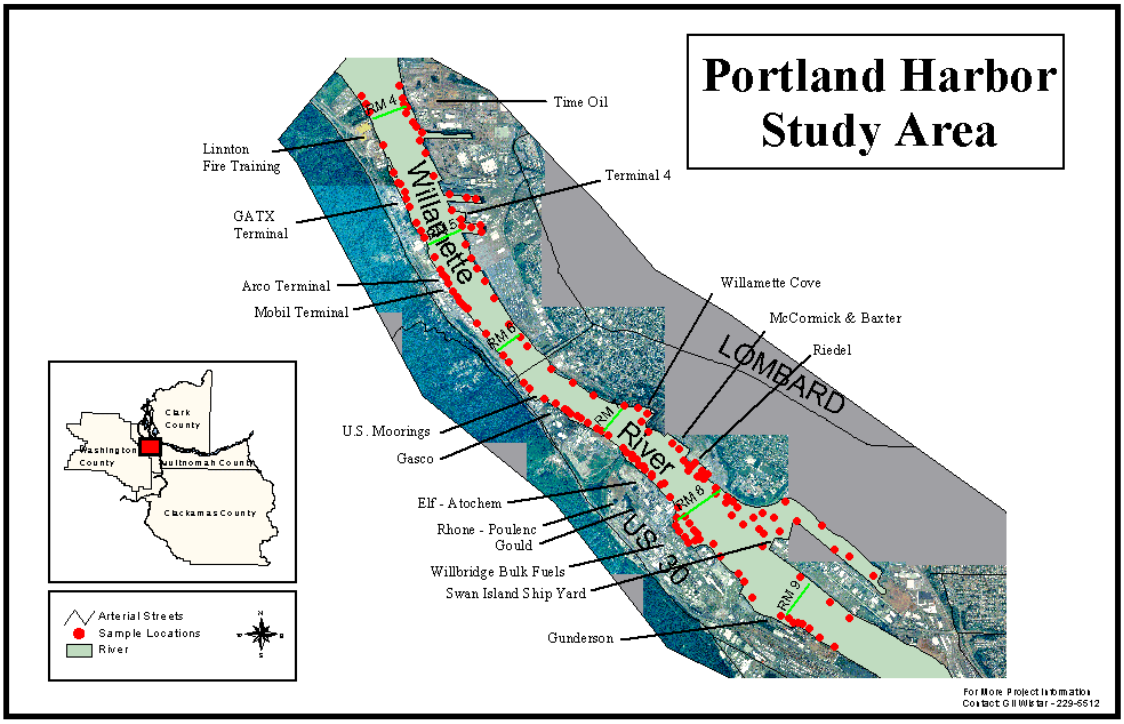
The city's action only appears exceptional because it occurred under a process that emphasizes property lines for the sake of redevelopment. The fundamental ideals behind revitalizing and redeveloping Brownfield parcels break down, though, if the contamination issues associated with them multiply among or impact a large area. To clarify, this is not so much a problem with the program itself, but with the resources presently committed and available to redevelopment entities—specifically municipalities. Cities in general view the legacy of contamination as a property-specific problem that disappears when the *land* is remediated. They cannot usually commit to investigating common property resources like aquifers or aqueous sediment, because they lack either statutory authority or adequate funds to do so. Private redevelopment entities, clearly, have little interest in becoming tied to a problem with an unclear definition of responsible parties. Additionally, because other municipalities may have contributed to the problem, the issue falls to the states—who, for reasons of their own, as in the case of CS, have established funding priorities (see the Clean Michigan Initiative criteria, Section 2.1).

In that light, Emeryville's initiative appears particularly remarkable. Adequate funding served as the key driving force, allowing the project to assist rapid redevelopment, as an entirely clean city proves more attractive than one with only a clean section or a clean corridor.

Portland, OR
<http://www.deq.state.or.us/wmc/cleanup/PortlandHarbor/plan/contents.html>
In Portland, ODEQ completed area-wide sediment sampling because of CERCLA-related concerns about several sites along the Willamette River. For more information, please refer to the linked Portland Harbor Sediment Management Plan linked above.

Interim Action

Hennepin County, MN—Chemical Marketing Corporation
If emergency-response requiring contamination does not exist on a site, utilizing pre-emptive



Source: ODEQ Portland Harbor Sediment Management Plan
<http://www.deq.state.or.us/wmc/cleanup/PortlandHarbor/plan/phplansec5fig-1.ppt>

phytoremediation may improve its market value. Often, a site owner cannot pay to clean up contamination and must rely on a buyer to steer the property through voluntary cleanup. However, the owner usually does not want to abandon the property and would like to receive some compensation for giving up the land. Planting trees and plants, and removing debris, can dramatically increase the attractiveness to a buyer, while helping to remediate some metals and providing a higher sale price for the owner. Admirable public involvement and education has occurred as a result of this federal pilot. Additionally, unlike some pilot locations, the community has chosen to address a more difficult State Superfund site and take a large step, rather than a tiny one, to generate momentum in their brownfield redevelopment process.

Beneficial Reuse Demonstrations

WRDA Sediment Decontamination Project

A shortage of aquatic disposal facilities caused several agencies with responsibility for the New York/New Jersey Harbor area to investigate beneficial reuse treatment technologies. These technologies would treat CS unsuitable for open water or CADF disposal. With support from the 1992 and 1996 Water Resources Development Acts, the USACE, EPA Region 2, and NY/NJ Port Authority will evaluate the BioGenesis Sediment Washing, IGT Thermal Cement Lock, and Westinghouse Vitrification methods in a series of four demonstrations. The BioGenesis pilot-scale projects, for one example, range in size from 500cy to 500,000cy and will conclude around 2002. The consortium hopes that the WRDA project will eliminate a sizable part of the harbor's CS problem, while the port deepens channels that will allow the area to compete for deep-draft container ship traffic. The port has set a cost ceiling of $35 per cubic yard for treatment, a large reduction from the average $200 per cubic yard, guaranteeing that the technologies emerging from the program will provide a good turnaround on investment.

Item	*General Sampling Cost*
Labor rate and Handling costs	$35/hr plus $10 per sample, respectively
Soil Collection	$10 per sample (hand); $600 per day + $30 per sample (Geoprobe)
Groundwater Sampling	>$40/sample plus well installation costs
Sediment Sampling	$30/sample (shallow), + equip. cost (deep water)
Lab Analysis for all samples listed above	$27 (assay) - $1200/sample , depending on contaminant

Source: US EPA-ORD NRMRL

Detroit River, MI—EPA Region 5 and Michigan DEQ

<http://www.deq.state.mi.us/swq/gleas/docs/seds/tctreat/trenton.htm>

Following an initial bench scale study of five remediation technologies applicable to both inorganic and organic contaminants, Michigan DEQ ended up satisfied with the same 3 methods as the WRDA New York/New Jersey project. From these three, Michigan selected the Institute of Gas Technology (IGT) Thermal Cement Lock process as the most marketable technology with the greatest potential for reuse, and has partnered with EPA Region 5 for upcoming pilot scale work with that process. IGT received a grant of $200,000 to find a site for its 30,000-cubic yard kiln apparatus along the Black Lagoon/Trenton Channel adjacent to the Detroit River. No viable PRP exists for this location, no redevelopment is anticipated due to the severe contamination, and institutional controls such as fish advisories remain the only actions taken at this particular location. However, Region 5's *R/V Mudpuppy* completed extensive sediment assessment work on this stretch of the river, adding to a 20-year store of CS knowledge. Officials remain very optimistic that the beneficial reuse prospects for dredged material will allow them to recover costs that the absence of a PRP would otherwise prevent. Additionally, they hope that the turnaround value of the process will prove attractive in the voluntary setting, as the IGT process can handle a wide variety of wastes, from TOSCA material to brownfield soil.

3.6 Future research needs

3.6a Cost/benefit analysis needs

For landward soil characterization technologies, most of the technical information (e.g., how the tool works, why it works) is available from the references listed in the Contacts or Verification tables accompanying this document. Some of the technologies are recognized as fundamentally sound by other scientific disciplines, such as gas chromatography, while others have experienced at least limited application in a setting where one could record cost information. The balance of the landward tools, as well as all of the sediment assessment tools, remain in the bench or pilot scale stage.

Most of the cost information remains inaccessible, however, since that type of documentation exists only between the client and the firm. An agency would not keep track of that data unless it was paying for the work through a grant or targeted assessment program. It seems clear that the case for innovative site characterization technologies would receive a large boost if more cost/benefit analysis occurred, with comparison to conventional characterization methods. The best-cited examples so far, however—the Expedited Site Characterization Demonstration properties in New Orleans, LA, Brownfields pilot—faced their own field problems, which had little to do with the accuracy of the instruments[40]. One may also find the following generalized data useful[41]:

This project could not collect cost information on a national scale in such a short time frame. Because of the difficulty in even identifying useful properties for cost/benefit analysis, that task became the primary focus of the research. Those familiar with the EPA will note that preparing case study reports can be left to research contractors, once the identification and investigation ends. More useful at this stage is an expandable dataset that can provide tool

application information on a nationwide scale. From this, trends may appear that include:

- Geographic concentration of assessment tool use (particularly by state, once additional VCP data is collected)
- A clearer picture of the market fragmentation and contaminant breakdown among brownfields and voluntary sites
- Clear differences in innovative tool application and pricing between firms
- Overall cost savings for innovative sites versus those using conventional technology (comparing within media and contaminant categories).
- Cross-regulatory comparisons of assessment tool use between voluntary and mandated/enforcement-type programs.

None of this information—from which an analyst could identify exactly which policies were not working and the reasons why; and from which a technology "consumer" could gain valuable insight—will be available without a solid dataset of properties. In this case, waterfront properties comprise the dataset focus for their unique policy issues discussed above, and also to limit the scope slightly.

3.6b Additional research needs

- Inter-State regulation comparisons on field-portable technology use
- Intra-State field tool application frequency comparisons between regulatory programs
- Cost of inter-state regulation differences to field-portable technology vendors
- Cost-benefit analysis on how much a municipality would save by pursuing a cooperative approach to sediment assessment
- Cost-benefit analysis on field-based sediment assessment tools
- Analysis of the groundwater leaching pathway—how do areawide or property line assessments of groundwater impact sediment assessment?

4. Conclusions

Gorte notes that, "the pressure to find cheaper and more effective technologies for assessment and cleanup of brownfields will continue to build"[42]. Without a baseline to compare to, these results at least show some promise for field-portable tools. Behind the results, however, lies the stifling atmosphere of multiple agency policies, multiple permitting processes, and inconsistent acceptance of verification and certification data. Despite the powerful driver of waterfront property's resale value, no amount of cost/benefit work for the property owner will sway regulators resistant to integrating field tools—particularly on-site analysis tools—into their programs.

Potentially, lessons learned from developing and applying field tools to soils could be used to prevent similar mistakes and obstacles with the field screening and field analysis tools in development for sediments. With a few exceptions among the most financially supported and most advanced state environmental agencies, however, this seems unlikely. Most field tools, aside from PIDs and soil gas samplers, remain in the middle or stuck at the start of their quest for acceptance. Field screening and analysis tools for sediments face an additional collective action problem among their prospective waterfront clients. Enhanced cooperation among waterfront regulators and property owners has proven its ability to expedite sediment assessment and cleanup, and therefore provides an emerging opportunity for technology transfer.

Other References and Recommended Reading

EPA Publications

Brownfields Pilot Locations and Fact Sheets, Series 500-F-97 and 500-F-98. Office of Solid Waste and Emergency Response, EPA, Washington, DC.

Tool Kit of Information Resources for Brownfields Investigation and Cleanup (EPA/542/B-97/001). Office of Solid Waste and Emergency Response, EPA, Washington, DC.

Road Map to Understanding Innovative Technology Options for Brownfields Investigation and Cleanup (EPA/542/B-97/002). Office of Solid Waste and Emergency Response, EPA, Washington, DC.

Field Analytical and Site Characterization Technologies (with out of date tables) (EPA/542/R-97/011). Office of Solid Waste and Emergency Response—TIO, EPA, Washington, DC. November, 1997.

Quality Assurance Guide for Conducting Brownfields Site Assessments (EPA/540/R-98/038). Office of Solid Waste and Emergency Response, EPA, Washington, DC. September 1998.

Treatment Technologies for Site Cleanup: Annual Status Report (9th Ed.) (EPA/542/R-99/001). Office of Solid Waste and Emergency Response—TIO, EPA, Washington, DC. April 1999.

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Center for Environmental Management, January 1999.

ASTM Standard Provisional Guide for Accelerated Site Characterization (ASC). American Society for Testing and Materials, 1997.

Other publications—policy

Bartsch, Charlie and Christine Anderson. Matrix of Brownfield Programs by State. Northeast-Midwest Institute, Washington, DC, September 1998.

Bouges, Maureen. "Oregon Hail: Portland's Pioneering Ways." *Brownfields*. Volume 3, Issue 3, June 1999.

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[1] Internal Document: "Expediting the Site Characterization Process at Three Brownfields Sites in New Orleans, Louisiana: Case Study". Prepared for U.S. EPA by Tetra Tech EM, Inc, Sherry Gernhofer, Work Assignment Manager, December 12, 1997, Table 6-4.
See also *Cost Estimating Tools and Resources for Addressing Sites Under the Brownfields Initiative* (EPA/625/R-99/001). Office of Research and Development, EPA, Washington, DC, April 1999.

[2] Refer to the "Oversight" data in this paper. City Redevelopment Agencies and Economic Development Authorities traditionally serve as middlemen in the resale process, allowing them to recover costs for cleanup.

[3] *Superfund: Barriers to Brownfield Redevelopment (GAO/RCED-96-125)*. General Accounting Office, Washington, DC, June 1996, p. 2.

[4] *An Analysis of State Superfund Programs: 50-State Study, 1998 Update*. Environmental Law Institute, Washington, DC, 1998.

[5] Ibid.

[6] *Superfund: Barriers*, p. 9

[7] Gorte, Julie F. *Marketing Brownfield Cleanup Technologies*. Northeast-Midwest Institute, Washington, DC, February 1999.

[8] Cleaning Up the Nation's Waste Sites: Markets and Technology Trends (1996 Ed.) (EPA/542/R-96/005). Office of Solid Waste and Emergency Response-TIO, EPA, Washington, DC, April 1997, Sections 9.3-9.4.

[9] Cleaning Up the Nation's Waste Sites: Markets and Technology Trends (1996 Ed.) (EPA/542/R-96/005). Office of Solid Waste and Emergency Response-TIO, EPA, Washington, DC, April 1997, Sections 9.3-9.4.

[10] Internal Document: "Brownfields Data Collection Sources." Report for EPA-OSWER Outreach and Special Projects Staff. Kensington Systems, Inc., Los Angeles, CA. March 1999.

[11] Ibid.

[12] *An Analysis of State Superfund Programs: 50-State Study, 1998 Update*. Environmental Law Institute, Washington, DC, 1998, p. 20.

[13] Ibid.

[14] Personal Communication, Dr. Thomas DeKay, EPA-TIO

[15] Clean Michigan Initiative. Michigan DEQ, Lansing, MI, 1997.

[16] Personal Communication, Mr. Chad Howell, City of Kalamazoo, MI. June 1999.

[17] *The Incidence and Severity of Sediment Contamination in Surface Waters of the United States - Volume 1: National Sediment Quality Survey (EPA/823/R-97/006)*. Office of Science and Technology, EPA, Washington, DC, April 1997.

[18] Brannon, J.M.; McFarland, V.A. Technical Considerations for Sediment Quality Criteria. Miscellaneous Paper W-96-1. Water Quality '96: Proceedings of the Corps of Engineers 11th Seminar on Water Quality, Feb. 26th-Mar 1st, 1996, Seattle, Washington. USACE-WES, Vicksburg, MS, 1996, pgs. 346-352.

[19] Personal Communication, Mr. Art Ostaszewski, Michigan DEQ.

[20] For two very different perspectives on dredging, consult the USACE E2-D2 page and GE's HudsonWatch page.

[21] Clean Michigan Initiative. Michigan DEQ, Lansing, MI, 1997, p. 8 of online edition.

[22] NRC Report: Contaminated Sediments in Ports and Waterways: Cleanup Strategies and Technologies. Bokuniewicz, Henry, et al. National Academy of Sciences, Washington, DC, 1997, p. 5.

[23] For more on state-federal cost recovery issues, see the Testimony of Ms. Claudia Kerbwy, ASTSWMO, March 23, 1999, before the House Commerce Subcommittee on Finance and Hazardous Materials.

[24] NRC Report, p. 1.

[25] Personal Communication, Mr. Tommy E. Myers, Ph.D., June 29, 1999.

[26] NRC Report, p. 171.
[27] Internal Document: "Special Report: Funding Brownfield Remediation with the Clean Water State Revolving Fund." Report from Kristin S. Kenausis, Communications Specialist, State Revolving Fund Branch, EPA Office of Water, July 1999.
[28] Ibid.
[29] Personal Communication, Ms. Jennifer Millet, EPA-OSPS, meeting with Mr. Andrew Kreider and EPA-TIO representatives, June 1999.
[30] These and preceding statistics in paragraph from "Special Report: Funding Brownfield Remediation with the Clean Water State Revolving Fund."
[31] NRC Report, p. 42.
[32] Ibid., p. 42.
[33] See American Trucking Associations vs. U.S. EPA, May 14, 1999, and the Federal Response
[34] See http://www.epa.gov/superfund/whatissf/cercla.htm
[35] NRC Report, p. 73.
[36] Personal Communication, Mr. Tommy E. Myers, Ph.D., June 29, 1999.
[37] See "Brownfields Data Collection Sources."
[38] See PDEP Brownfields Inventory Grants
[39] Internal Document: "Expediting the Site Characterization Process at Three Brownfields Sites in New Orleans, Louisiana: Case Study". Prepared for U.S. EPA by Tetra Tech EM, Inc, Sherry Gernhofer, Work Assignment Manager, December 12, 1997, p. 5.
[40] Ibid., p. 6 and Table 6-4.
[41] *Cost Estimating Tools and Resources for Addressing Sites Under the Brownfields Initiative* (EPA/625/R-99/001). Office of Research and Development, EPA, Washington, DC, April 1999, pgs. 21-22.
[42] Gorte, p. 2.

Appendix A. Data Matrix, Contact List, and data tables for 115 sites on the following topics: Oversight, Progress, Field Tool Application, Contaminants, Remediation, Sediment Assessment, and proximity to NPL

Table A-1. Matrix

EPA Reg.	City	Site	I	II	III	Ownership	VOCs	SVOCs	PCBs	PAHs	Cl. Solv	TPH	Unsp Metals, Inorganics	Cr	Pb	As	Ni	Zn	CN, FeCN	Hg	Be	Pesticides or dioxin	TBT	PCP, phenols	Asbestos	Coal tar, fly ash	F.T. Use?	Sed sample?
1	Bridgeport, CT	Jenkins Isle/Bluefish ballpark	X			M																						
1	Danbury, CT	Kohanza Brook Property	X	X	X	M						X	X							X								Y	Y
1	Danbury, CT	Mallory Hat Factory	X	X	X	M									X	X				X						X			Y
1	Middletown, CT	Peterson Oil Company	X	X		M						X																	
1	Middletown, CT	Portland Chemical	X			M	X		X		X																		
1	Norwich, CT	Falls Ave. Mill, Thames River				M																							
1	Norwich, CT	Marina	X	X		M																						N	
1	Chicopee, MA	Foundry w/ lead contamination				P																							
1	Chicopee, MA	Dac Hur/Hamden Steel	X			P																							
1	Lawrence, MA	Oxford Paper Company	X			M	X				X											X							
1	Lawrence, MA	Everett Mills	X			M																							
1	Lawrence, MA	Atlantic Power	X			M																							
1	Lawrence, MA	Lawrence Textile	X			M																							
1	Lowell, MA	Davison Street Lots				I																							
1	Lowell, MA	Baseball Stadium	X			M																					X		
1	Lowell, MA	Tsongas Arena	X			M						X															X		
1	Lynn, MA	Beacon Chevrolet	X			M				X		X	X															Y	N
1	New Bedford, MA	Sites to be determined				I																							
2	Buffalo, NY	LTV Steel hydroponic tomato	X			P				X		X																	
2	Buffalo, NY	Hanna Furnace/Union Ship Canal	X	X	X	M	X	X	X	X	X		X																Y
2	Buffalo, NY	Squaw Isl. USACE dredge disposal area	X	X	X	M, U	X	X					X																
2	Glen Cove, NY	Captains Cove Condominiums	X	X	X	M	X	X	X				X															Y	Y
2	Glen Cove, NY	Bona-Fide Ready Mix				P		X					X																Y
2	Glen Cove, NY	A-1 Carting				P		X					X																Y
2	Glen Cove, NY	Gladsky Marine Salvage				P		X					X																Y
2	Glen Cove, NY	Hawkins Cove (Doxey)				P		X					X																
2	Ogdensburg, NY	Municipal Arena	X	X		M																						N	
2	Ogdensburg, NY	Diamond International Site	X	X		M	X	X																		X		N	Y
2	Ogdensburg, NY	Lighthouse Point	X	X		M																						N	
2	Ogdensburg, NY	Former tank farm	X	X		M						X	X															N	
2	Yonkers, NY	Alexander Street Waterfront				M																							
3	Cape Charles, VA	Town Parcel	X			M, C																						Y	
3	Pittsburgh, PA	LTV South Side Steel works	X	X		E		X	X			X		X	X	X	X	X										N	N
3	Pittsburgh, PA	Washington's Landing/Herr Island parcels	X	X		E																						N	N
3	Pittsburgh, PA	Washington's Landing/Herr Island parcels	X	X		E	X	X	X	X																		N	N
3	Pittsburgh, PA	Duquesne Slag - 9 mile run	X		X	E							X	X														Y	Y
3	Pittsburgh, PA	Pittsburgh Tech Center	X	X		E													X								X	G	N
4	Charleston, SC	Sites to be determined				I																							
4	East Point, GA	Cotton Mill waste lagoon	X	X		M	X		X																			Y	N
4	Clearwater, FL	Stevenson Creek junkyard				M	X	X		X			X									X							Y
4	Jacksonville, FL	Sites to be determined				I																							
5	East Moline, IL	City landfill	X	X		M	X	X	X	X																		G	N
5	Waukegan, IL	Madison Street properties				I																							
5	Kalamazoo, MI	Auto Ion Area, Mills Street	X	X		M								X					X										
5	Kalamazoo, MI	Consumers Power North				M						X	X																
5	Kalamazoo, MI	Riverfront BRI Site (CP South)	X	X		M																							Y
5	Muskegon, MI	Shoreline Project - multiple properties				I																							
5	St. Joseph, MI	Auto Specialties Site (parcel 1S)	X	X	X	M				X		X	X																N
5	St. Joseph, MI	Whirlpool Property	X			P								X	X	X												Y	N
5	Benton Harbor, MI	Former Superior Steel				M*	X	X				X	X																N
5	Benton Harbor, MI	Malleable Site				M*					X			X					X	X									N
5	Benton Harbor, MI	CSX Railway Site				M*																							N
5	Benton Harbor, MI	Lk MI Coll Tech Center	X	X		E																							
5	Traverse City, MI	Traverse City Iron Works	X			M							X																
5	Hennepin County, MN	Chemical Marketing Corp - StSfund				P					X	X																	
5	Girard, OH	Ohio Leather Company				M																							
5	Southern Ohio Port Author	Empire Detroit Steel Mill (VCP 16.8 ac)	X	X		A			X			X	X		X											X			
5	Southern Ohio Port Author	Empire Detroit Steel Mill (3 parcels)	X	X		A																							
5	Tallmadge, OH	Simcox Steel and Grinding Co.	X			P																							
5	Toledo, OH	Chevron Refinery	X			P																							
5	Youngstown, OH	Six mile riparian corridor				I																							
5	Youngstown, OH	34 acre industrial park				I																							
5	Youngstown, OH	40-acre res/light commercial				I																							
5	Youngstown, OH	29-acre vacant ind park				I																							
5	Youngstown, OH	30-acre former steel mill				I																							
5	Kenosha, WI	Harborpark Center - Fmr Chrysler	X			M			X																	X		Y	
6	New Orleans, LA	Saratoga Street	X	X		M	X	X	X	X		X	X									X						Y	N
6	New Orleans, LA	Powers Junction	X	X		M	X	X	X	X		X	X									X						Y	N
6	New Orleans, LA	Hendree Court	X	X		M	X	X	X	X		X	X									X						Y	N
6	Shreveport, LA	Fairgrounds Parcels	X			M	X					X																Y	N
6	Baytown, TX	EPC - Nitrogen Benzene Transfer Station	X			P						X																	
6	Channelview, TX	Hutchison-Hayes International	X			P						X	X																
6	Channelview, TX	Zapata Offshore Property	X	X		P																						Y	N
6	Channelview, TX	KOCH Refining Terminal	X			P						X																Y	
6	Corpus Christi, TX	Keeper's Locker, Inc.	X			P						X																	
6	Galena Park, TX	Woodhouse Terminal - Port of Houston	X			P						X																	

EPA Reg.	City	Site	I	II	III	Ownership	VOCs	SVOCs	PCBs	PAHs	Cl. Solv	TPH	Unsp Metals, Inorganics	Cr	Pb	As	Ni	Zn	CN, FeCN	Hg	Be	Pesticides or dioxin	TBT	PCP, phenols	Asbestos	Coal tar, fly ash	F.T. Use?	Sed sample?
6	Galveston, TX	Tatsumi USA/Todd Shipyard Facility	X			P																						
6	Galveston, TX	SPTCo Galveston Wharves Site	X			P		X																				
6	Houston, TX	Lafarge - Clinton Drive Facility	X			P				X		X	X															
6	Houston, TX	Unoccupied Sandblasting/Painting Site	X	X		P	X				X		X															
6	Houston, TX	Foster Products Corporation	X	X		P	X				X		X														Y	
6	Ingleside, TX	Ingleside Offshore Services Property	X			P						X																
6	Lynchburg, TX	Channel Shipyard, Inc.	X			P					X	X																
6	Port Isabel, TX	Amerada Hess Refinery	X			P	X					X	X															
7	Omaha, NE	City Dock Board				M			X	X		X	X															
7	Omaha, NE	ASARCO	X	X		P			X	X			X		X	X		X		X		X						Y
7	Omaha, NE	Freedom Park Landfill				M	X	X					X															
7	Kansas City, MO	Riverfront Port Authority Park Project	X	X	X	M, A																						Y
7	Cedar Rapids, IA	Meat rendering and other facilities				I																						
7	Coralville, IA	Iowa River Power Plant and Assoc. Parcels				I																						
9	Richmond, CA	Terminal I - Petromark	X	X		M	X		X				X									X					Y	N
9	Richmond, CA	Marina Bay Parcels - WWII shipyards	X	X		E	X						X															
9	Richmond, CA	Point Molate Naval Fuel Station	X	X		N			X		X	X	X														Y	
9	Stockton, CA	Weber Block	X	X	X	M																					Y	Y
9	San Francisco, CA	Pacific Bell Park	X			M									X												N	N
10	Falls City, OR	Atlas Mill	X			M			X	X	X		X			X					X	X					N	N
10	Harlan, OR	Old Harlan Mill	X		X	M	X	X				X	X	X			X				X	X					G	Y
10	Portland, OR	Willamette Cove				M			X	X			X										X					Y
10	Portland, OR	U.S. Government Moorings				U				X			X									X	X					Y
10	Portland, OR	Triangle North Portland Yard/Riedel	X		X	P	X		X	X		X	X										X					Y
10	Portland, OR	Port of Portland Terminal 4	X	X	X	A				X		X	X														G	Y
10	Portland, OR	GASCO/NWNG	X	X	X	P	X					X																Y
10	Portland, OR	Elf Atochem	X	X	X	P	X															X						Y
10	Portland, OR	Portland Shipyard	X		X	A			X	X		X	X										X					Y
10	Portland, OR	North Marine Drive	X			M																X						N
10	Portland, OR	Time Oil Company	X	X		P																		X				Y
10	Portland, OR	Mobil Oil	X	X		P						X																Y
10	Portland, OR	Gunderson	X	X		P	X		X		X	X	X															Y
10	Portland, OR	Moody Avenue Property	X			P			X	X		X			X							X						N
10	White City, OR	Former Whetstone Landfill	X	X		M	X			X			X									X					G	Y
10	Bellingham, WA	Olivine Property	X	X		A	X			X		X	X	X						X					X		Y	Y
10	Bellingham, WA	Roeder Avenue Landfill	X	X		A	X						X	X	X			X		X					X		Y	Y
10	DuPont, WA	Former Du Pont Explosives Plant	X			P	X	X	X			X	X		X													N
10	Seattle, WA	Lake Union Steam Plant	X		X	P			X			X			X											X	Y	Y
10	Tacoma, WA	Thea Foss Wtwy - multiple properties				I																						
10	Ketchican, AK	Pulp Mill	X		X	P	X					X	X														Y	Y
	Totals	**116 Sites**	**76**	**25**	**18**		**34**	**22**	**25**	**22**	**11**	**39**	**46**	**8**	**10**	**5**	**2**	**3**	**3**	**6**	**2**	**13**	**4**	**3**	**5**	**3**	**22/5/10**	**31/23**

Key

Headings
I - Phase II characterization complete for soils
II - Phase II characterization complete for groundwater
III - Phase II characterization complete for aqueous sediment

Ownership
M - Municipal
P - Private
A - Port Authority
U - U.S. Army Corps of Engineers
I - Inconclusive (usually still in identification stage)
E - Local Economic Development Authority
M* - Muncipality in process of acquiring
N - Navy or Navy Base Realignment and Closure Commission
C - County

Contaminant classes of concern
For some sites, these contaminants are presumptive based on past land use. Not all sites provided or knew all of their contaminants. See the Contaminants table to distinguish between known and suspected pollutants, as well as the best available information on the media they were located in.
VOCs - Volatile organic compounds
SVOCs - Semi-volatile organic compounds
PCBs - Polychlorinated biphenyls
PAHs - Polynuclear aromatic hydrocarbons
Cl. Solvents - Chlorinated Solvents
TPH - Total petroleum hydrocarbons
Unsp. Metals - Contamination due to unspecified metals
Cr- Chromium
Pb - Lead
As - Arsenic
Ni - Nickel
Zn - Zinc
CN - Cyanide, FeCN - Ferrous Cyanide
Hg - Mercury
Be - Beryllium
Pesticides - may include DDT, DDE, DDD, dieldrin, others
TBT - Tribuytlytin
PCP - Pentachlorophenol

F.T. (Field-portable Tool) Use?
Y - denotes known application of field portable tools and technologies at this site
G - denotes known application of Geoprobe as only field portable tool
N - denotes known non-application of field portable tools and technologies at this sites
(Blank) - indicates incomplete information. See "Tool data" table for an explanation of why data quality control precluded some sites with possible or probable field portable tool use was not indicated here.
Totals: Y/G/N

Sed sample? (Was aqueous sediment sampled at or around this site?)
Y - denotes known sediment sampling
N - denotes a known case of non-sampling
(Blank) - indicates incomplete information. See "Sediment" section for an explanation of why data quality control precluded some sites with possible or probable field portable tool use was not indicated here.
Totals: Y/N

Table A-2. Contacts

City	Site	Contact	Affiliation	Phone
Bridgeport, CT	Jenkins Isle/Bluefish ballpark	Mr. Steve Tyliszczak	City of Bridgeport	203-576-7221
Danbury, CT	Kohanza Brook	Mr. Jack Kozuchowski	City Health Dept	203-797-4625
	Mallory Hat Factory	Mr. Jack Kozuchowski	City Health Dept	203-797-4625
Middletown, CT	Peterson Oil Company	Mr. Jim Sipperlee	City Planning Dept	860-344-3425
		Mr. Jim Olsen	Marin Env. Services	860-345-4578
	Portland Chemical	Mr. Jim Sipperlee	City Planning Dept	860-344-3425
		Mr. Steve Holtman	Woodward & Curran	203-271-0379
Norwich, CT	Riverfront Mill, Thames River	Ms. Kelly Stackowicz	City Econ Develop	860-823-3822
	Marina	Ms. Kelly Stackowicz	City Econ Develop	860-823-3822
Chicopee, MA	Foundry w/ lead contamination	Mr. Carl Dietz	City of Chicopee	413-594-4711
	Dac Hur/Hamden Steel	Mr. Carl Dietz	City of Chicopee	413-594-4711
Lawrence, MA	Oxford Paper Company	Ms. Kim Pisa	EPA Region 1 liaison	888-372-7341
	Everett Mills	Ms. Kim Pisa	EPA Region 1 liaison	888-372-7341
	Atlantic Power	Ms. Kim Pisa	EPA Region 1 liaison	888-372-7341
	Lawrence Textile	DEP Northeast Region	State of Massachusetts	978-661-7677
Lowell, MA	Davison Street Lots	Mrs. Carol Tucker	City Planning Dept	978-970-4274
	Baseball Stadium	Mrs. Carol Tucker	City Planning Dept	978-970-4274
	Tsongas Arena	Mrs. Carol Tucker	City Planning Dept	978-970-4274
Lynn, MA	Beacon Chevrolet	Mr. James Chow	EPA Region 1	617-918-1394
New Bedford, MA	Sites to be determined	Ms. Molly Fontaine	City of New Bedford	508-979-1485
Buffalo, NY	LTV Steel hydroponic tomato	Mr. Dennis Sutton	City Ofc of the Env	716-851-4852
	Hanna Furnace/Union Ship Canal	Mr. Dennis Sutton	City Ofc of the Env	716-851-4852
		Mr. Steve Golyski	USACE-Buffalo	716-879-4104 x4228
	Squaw Isl. USACE dredge disposal area	Mr. Joe Giambria	City Public Works	716-851-5636
Glen Cove, NY	Captains Cove Condominiums	Mr. Robert Benrubi	Econ Develop Agency	516-676-1625 x100
	Bona-Fide Ready Mix	Mr. Robert Benrubi	Econ Develop Agency	516-676-1625 x100
	A-1 Carting	Mr. Robert Benrubi	Econ Develop Agency	516-676-1625 x100
	Gladsky Marine Salvage	Mr. Robert Benrubi	Econ Develop Agency	516-676-1625 x100
	Hawkins Cove (Doxey)	Mr. Robert Benrubi	Econ Develop Agency	516-676-1625 x100
Ogdensburg, NY	Municipal Arena	Mr. Martin Murphy	City Planning Dept	315-393-7150
		Mr. John Blaum	Camp,Dresser&McKee	518-482-3000
	Diamond International Site	Mr. John Blaum	Camp,Dresser&McKee	518-482-3000
	Lighthouse Point	Mr. John Blaum	Camp,Dresser&McKee	518-482-3000
	Former tank farm	Mr. John Blaum	Camp,Dresser&McKee	518-482-3000
Yonkers, NY	Alexander Street Waterfront	Ms. Chelsea Albucher	EPA Region 2	212-637-4360
Cape Charles/Northampton County, VA	Town Parcel	Mrs. Josie Matsinger	EPA Region 3	215-814-3132
Pittsburgh, PA	LTV South Side Steel works	Dr. Deborah Lange	Carneige-Mellon/TBC	412-268-7121
		Mr. Jim Nairn	Civil and Environmental Consultants	800-365-2324
	Washington's Landing/Herr Island parcels 1, 2a, 2b, 3, 4, 5, 6, 7, 8	Dr. Deborah Lange	Carneige-Mellon/TBC	412-268-7121
		ICF-Kaiser	Pittsburgh, PA	412-497-2000
	Washington's Landing/Herr Island parcels 10, 11south, 12	Dr. Deborah Lange	Carneige-Mellon/TBC	412-268-7121
		GAI Consultants	Monroeville, PA	412-856-6400
	Duquesne Slag - 9 mile run	Dr. Deborah Lange	Carneige-Mellon/TBC	412-268-7121
	Pittsburgh Tech Center	Dr. Richard Luthy	Carneige-Mellon/TBC	412-268-7121
Charleston, SC	Sites to be determined	Mrs. Barbara Dick	EPA Region 4	404-562-8923
		Mrs. Geona Johnson	Enterprise Community	803-973-7285
East Point, GA	Cotton Mill waste lagoon	Mr. John Dwyer	Chemron	404-636-0928

Clearwater, FL	Stevenson Creek junkyard	Mr. Miles Ballogg	City of Clearwater	727-562-4023
Jacksonville, FL	Sites to be determined	Mrs. Beverly Williams	EPA Region 4	404-562-8493
East Moline, IL	City landfill	Mrs. Jane Neumann	EPA Region 5	312-353-2000
Waukegan, IL	Madison Street properties	Mrs. Jan Pels	EPA Region 5	312-886-3009
Kalamazoo, MI	Auto Ion Area, Mills Street	Mr. Chad Howell	Econ Dev and Planning	616-337-8044
	Consumers Power North	Mr. Chad Howell	Econ Dev and Planning	616-337-8044
	Riverfront BRI Site (CP South)	Mr. Chad Howell	Econ Dev and Planning	616-337-8044
Muskegon, MI	Shoreline Project - multiple properties	Mr. Scott Miller	Superior Environmental	616-677-5255
St. Joseph, MI	*All DEQ-WMD or voluntary CMI*	*Contacts for all sites*	*Contacts for all sites*	*Contacts for all*
	Auto Specialties Site	Ms. Lorrie Thomas	DEQ-Plainville Office	616-692-2688
	Whirlpool Property	Mrs. Keary Cragan	EPA Region 5	313-353-5669
	Former Superior Steel	Mr. Evan LeDuc	Cornerstone Alliance	616-925-6100 x212
	Malleable Site	Mr. Dale Corsi - Malleable only	Snell Environmental Gp	517-374-6800
	CSX Railway Site			
Traverse City, MI	Traverse City Iron Works	Mr. Randy Smith	Traverse Group, Inc	734-747-9300
Hennepin County, MN	Chemical Marketing Corp - StSfund	Mrs. Catherine Geisler-Kisch	Hennepin County	612-348-4949
		Mr. Dan Dickel	City of Chanhassen	612-472-7536
Girard, OH	Ohio Leather Company	Ms. Trish Nuskievicz	Trumbull Cty Planning	330-545-3879
Southern Ohio Port Authority, OH	Empire Detroit Steel Mill	Mr. Ross Powers	EPA Region 5	734-692-7681
Tallmadge, OH	Simcox Steel and Grinding Co.	Ms. Gerri Cauley	Ohio VAP	614-644-2924
Toledo, OH	Chevron Refinery	Ms. Gerri Cauley	Ohio VAP	614-644-2924
Youngstown, OH	Six mile riparian corridor	Brownfields Coordinator	Economic Development	330-744-1708
	34 acre industrial park	Brownfields Coordinator	Economic Development	330-744-1708
	40-acre res/light commercial	Brownfields Coordinator	Economic Development	330-744-1708
	29-acre vacant ind park	Brownfields Coordinator	Economic Development	330-744-1708
	30-acre former steel mill	Brownfields Coordinator	Economic Development	330-744-1708
Kenosha, WI	Harborpark Center - Fmr Chrysler	Mr. Mick Warner	RMT, Inc. (sediments)	608-662-5243
New Orleans, LA	Saratoga Street	Mrs. Monica Smith	EPA Region 6	214-665-6780
	Powers Junction	Mrs. Monica Smith	EPA Region 6	214-665-6780
	Hendree Court	Mrs. Monica Smith	EPA Region 6	214-665-6780
Shreveport, LA	Fairgrounds parcels	Dr. Roy Dowling	ALTEC Environmental	888-772-5832
Baytown, TX	EPC - Nitrogen Benzene Transfer Station	Mr. Peter Wehner	TNRCC	512-239-4133
	(VCP ID 593)	Mr. Brian Magruder	Exxon Pipeline Co.	713-656-2190
Channelview, TX	Hutchison-Hayes International	Mr. Peter Wehner	TNRCC	512-239-4133
	(VCP ID 387)	Ms. Lisa Edwards	Hutchison-Hayes	619-544-5242
		Mr. Steve Neely	Harding Lawson Associates	713-974-9611
	Zapata Offshore Property	Ms. Pat Fontenot	TNRCC	512-239-2132
	(VCP ID 489)	Mr. Keith Van Hook	EMCON	713-861-6877
	KOCH Refining Terminal	Mr. Richard Scharlach	TNRCC	512-239-1787
	(VCP ID 574)	Mr. Mark Aebi	Koch Refining Co.	316-828-6304
		Mr. Allen Walzel	Finch Energy & Env. Services	512-592-9810
Corpus Christi, TX	Keeper's Locker, Inc.	Mr. Raymond Hillis	TNRCC	512-239-1096
	(VCP ID 556)	Mr. Jack Smitherman	Everest Environmental	512-883-2831
Galena Park, TX	Woodhouse Terminal - Port of Houston	Mr. Byron J. Ellington	TNRCC	512-239-2253
	(VCP ID 162)	Ms. Laura Fiffick	Port of Houston	713-670-2438
		Mr. Paul Stephen	ERM-Southwest	281-579-8999
Galveston, TX	Tatsumi USA/Todd Shipyard Facility	Mr. Byron J. Ellington	TNRCC	512-239-2253
	(VCP ID 330)	Mr. Mark Urback	Lanier and Associates	504-895-0368
	SPTCo Galveston Wharves Site	Mr. Otu Ekpo-Otu	TNRCC	512-239-2445
	(VCP ID 977)	Mr. Peter J. Gagnon	ERM-Southwest	281-579-8999
Houston, TX	Lafarge - Clinton Drive Facility	Mr. Byron J. Ellington	TNRCC	512-239-2253

	(VCP ID 315)	Mr. William Voshell	Lafarge	810-948-1201
		Mr. Steve Haverl	Brown and Caldwell	303-750-3983
	Unoccupied Sandblasting/Painting Site	Ms. Pat Fontenot	TNRCC	512-239-2132
	(VCP ID 401)	Mr. J. Rick Renshaw	Fairfield Financial Group, Inc.	713-871-2080
	Foster Products Corporation (ID 989)	Mr. Peter Wehner	TNRCC	512-239-4133
Ingleside, TX	Ingleside Offshore Services Property	Mr. Raymond Hillis	TNRCC	512-239-1096
	(VCP ID 488)	Mr. Jack Smitherman	Everest Environmental	512-883-2831
Lynchburg, TX	Channel Shipyard, Inc.	Ms. Diane Coker	TNRCC	512-239-4670
	(VCP ID 317)	Mr. Troy Mefferd	Geo-Basics	318-433-8300
Port Isabel, TX	Amerada Hess Refinery	Ms. Phyllis Primrose	TNRCC	512-239-0730
	(VCP ID 483)	Mr. Stephen Freeman	Amerada Hess	713-609-5955
Omaha, NE	City Dock Board	Mrs. Susan Klein	EPA Region 7	913-551-7786
	ASARCO	Mrs. Susan Klein	EPA Region 7	913-551-7786
	Freedom Park Landfill	Mrs. Susan Klein	EPA Region 7	913-551-7786
Kansas City, MO	Riverfront Port Authority Park Project	Mrs. Debi Morey	EPA Region 7	913-551-7593
Cedar Rapids, IA	Meat rendering and other facilities	Mr. Jim Halverson	City Development	319-286-5045
Coralville, IA	Iowa River Power Plant/Assoc. Parcels	Brownfields Coordinator	City of Coralville	319-351-9069
Richmond, CA	Terminal I - Petromark	Mr. Wally Woo	EPA Region 9	415-744-1207
		Mr. Kent Kitchingman	EPA Region 9	510-620-6704
	Marina Bay - WWII shipyards	Mr. Kent Kitchingman	EPA Region 9	510-620-6704
	Point Molate Naval Fuel Station	Mr. Ken Spielman	US Navy	650-244-2539
Stockton, CA	Weber Block	Mr. Tom Mix	EPA Region 9	415-744-2378
		Mr. Jim Bradford	Black and Veatch	925-246-8000
San Francisco, CA	Pacific Bell Park	Public Relations	CalEPA DTSC	916-322-0476
Falls City, OR	Atlas Mill	Mr. Gil Wilstar	Oregon DEQ-Portland	503-229-5512
Harlan, OR	Old Harlan Mill	Mr. Gil Wilstar	Oregon DEQ-Portland	503-229-5512
Portland, OR		*Contacts for all sites*	*Contacts for all sites*	*Contacts for all*
	Willamette Cove	Mr. Chip Humphrey	EPA Region 10	503-326-2678
	U.S. Government Moorings	Mr. Mike Rosen	ODEQ Portland Sed.	503-229-6712
	Triangle North Portland Yard/Riedel	Mr. Doug MacCourt	Private Sector	503-226-1191
	Port of Portland Terminal 4			
	GASCO/NWNG			
	Elf Atochem			
	Portland Shipyard			
	North Marine Drive			
	Time Oil Company			
	Mobil Oil			
	Gunderson			
	Moody Avenue Property	Mr. Ken Novack	Schnitzer Corporation	503-224-9900
White City, OR	Former Whetstone Landfill	Ms. Claudia Johansen	Oregon DEQ-Medford	541-776-6010 x228
Bellingham, WA	Roeder Avenue Landfill	Mr. Mike Stoner	Port of Bellingham	360-676-2500
	Olivine Property	Mr. Mike Stoner	Port of Bellingham	360-676-2500
DuPont, WA	Former Du Pont Explosives Plant	Mr. Doug Hillman	Hart Crowser	800-858-9530
Seattle, WA	Lake Union Steam Plant	Mr. Chuck Whittlesey	Hart Crowser	800-858-9530
Tacoma, WA	Thea Foss - multiple properties	Mr. Charlie Solverson	City of Tacoma	253-591-5017
Ketchikan, AK	Pulp Mill	Ms. Marcia Combes	EPA Region 10 AK	206-553-1352

Other Contacts	Purpose	Name	Affiliation	Phone
AMS Samplers	New sediment sampler, ETV program	Mr. Brian Anderson	Art's Manf. And Supply	608-643-4913
SITE Program	Verification of sed tech for Superfund	Dr. Stephen Billets	US-EPA NERL	702-798-2232
SITE Program	Verification of sed tech for Superfund	Dr. Brian Schumacher	US-EPA NERL	702-798-2242
SW 846 Revisions	Impact of federal guidance, changes	Mr. Ollie Fordham	US-EPA OSW	703-308-0493
ORD Brownfields Work	Site specific bfield and cost reports	Mrs. Joan Colson	US-EPA ORD	513-569-7501
Amer Assoc of Port Auth	Brownfield work conducted by P.Auth	Mr. Tom Chase	AAPA	703-706-4715
Brownfields Initiative	General overview of bfields and ?s	Mr. Andrew Kreider	US-EPA OSPS	202-260-9192
Brownfields Initiative	Revolving Loan Fund	Ms. Jennifer Millet	US-EPA OSPS	202-260-6454
Market Obstacles to tech	Identify tech transfer and vendor probs	Mrs. Julie Gorte	NE/MW Institute	202-544-5200
Redevelopment obstacles	Identify redevelopment obstacles	Mrs. Ann Goode	NE/MW Institute	202-544-5200
Region 5 Sediments Team	Sediment issues facing Great Lks area	Mrs. Bonnie Elleder	EPA Region 5	312-886-4885
ARCS/Mudpuppy	Sediment issues facing Great Lks area	Mr. Marc Tuchman	ERA Region 5 GLNPO	312-353-1369
Commencement Bay, WA	Sediment issues facing Puget Sound	Ms. Christine Psyk	EPA Region 10 - TFW	206-553-1748

Commencement Bay, WA	Sediment issues facing Puget Sound	Ms. Mary Henley	City of Tacoma	253-502-2113
Bruker Analytical X-ray Sys.	S4 Explorer XRF	Mr. Bill Daub	Bruker-AXS NJ Office	201-930-0359
ORD Brownfields Work	Ongoing Research	Mr. Edwin Barth	US-EPA ORD	513-569-7669
Data Collection	CMI Project Manager Contacts	Ms. Susan Sandell	Michigan DEQ	231-775-3960x6312
Saint Paul Port Auth. Work	Brownfield work conducted by P.Auth	Mrs. Lorrie Lauder	SPPA	651-224-5686x236
Saint Paul Port Auth. Work	Waterfront redevelopment	Mr. Steve Hardie	SPPA	651-224-5686x240
21M-squared Meas & Mon	Measuring and Monitoring Tech Development	Mr. Dan Powell	US-EPA TIO	703-603-7196
Other Known Projects	**Purpose**	**Name**	**Affiliation**	**Phone**
Port of NY/NJ	Beneficial Reuse of Aquatic Sediments	Mr. Eric Stern	EPA Region 2	212-637-3806
Detroit River, MI	Beneficial Reuse of Aquatic Sediments	Mr. Marc Tuchman	EPA Region 5	312-353-1369
Detroit River, MI	Beneficial Reuse of Aquatic Sediments	Mr. Art Ostaszewski	Michigan DEQ	517-335-4491
Newark, NJ	Federal Brownfields	Mr. James Hacklar	EPA Region 2	732-321-6730
Newark, NJ	Federal Brownfields	Mr. Bill Libruzzi	Project Manager	973-802-1946
Trenton, NJ	Federal Brownfields	Ms. Nuria Morese	EPA Region 2	217-637-4302
Port of Chicago, IL	Harbours Golf Course	No contact	No contact	No contact
VCP and State Haz. Site Databases Online	**Program/URL**	**State - Agency**	**Site info, # of proj**	**Contaminant info**
Redevelopment Projects	FY 99 Clean Michigan Initiative <http://www.deq.state.mi.us/erd/fy99/CMI/fy99propa.html>	Michigan-DEQ ERD	Yes, 85	No
Imminent Danger Projects	FY 99 Clean Michigan Initiative <http://www.deq.state.mi.us/erd/fy99/CMI/fy99propb.html>	Michigan-DEQ ERD	Yes, 5	No
SAP/SAF Projects	Precursor to Clean MI Initiative <ftp://ftp.deq.state.mi.us/pub/erd/siterec/rptnews.pdf>	Michigan-DEQ ERD	Minimal, ~100	No
Haz. Site Database	Environmental Response Division <ftp://ftp.deq.state.mi.us/pub/erd/sites/sitedb.exe>	Michigan-DEQ ERD	Yes, 2857	Yes
Site Database	All programs - VCP-type is "Tier II" <http://www.magnet.state.ma.us/dep/bwsc/sites/report.htm>	Massachusetts DEP	Minimal, ~5000	No
Brownfields Directory	Land Recycling <http://www.dep.state.pa.us/dep/deputate/airwaste/wm/Landrecy/Inventory/Sites.htm>	Pennsylvania DEP	Yes, 21	No
VCP Database	VCP <http://sirb.awm.dnrec.state.de.us/REPORTS/vcp.txt>	Delaware DNREC	Minimal, 63	No
Brownfield Successes	VCP <http://sirb.awm.dnrec.state.de.us/brown_success.htm>	Delaware DNREC	Minimal, 10	No
Brownfields Inventory	Superfund Division <http://wastenot.ehnr.state.nc.us/SFHOME/bf-inv.HTM>	North Carolina DEHNR	Minimal, 9	No
Haz. Site Inventory	Hazardous Waste Mgmt Branch <http://www.ganet.org/dnr/environ/gaenviro/>	Georgia DNR EPD	Yes, 426	Yes
Brownfield Areas	Department of Waste Management <http://www.dep.state.fl.us/dwm/programs/brownfields/processes/areas.pdf>	Florida DEP	Minimal, 9	No
State Grant Recipients	Brownfields <http://www.dep.state.fl.us/dwm/programs/brownfields/grants/flrecip.pdf>	Florida DEP	Minimal, 11	No
SEIDS	Site Environmental Info Data System <http://www.epa.state.il.us/land/seids/>	Illinois EPA SRP	Minimal, ~400	No
Case Study List	Brownfields <http://www.state.in.us.idem/oer/brownfields/case_studies/case_st.html>	Indiana DEM OER	Yes, 31	Yes
VRP Site List	Voluntary Remediation Program	Indiana DEM OER	Minimal, 230	No
VIC Site List	Voluntary Investigation and Cleanup <http://blue.pca.state.mn.us/pca/vicsearch.html>	Minnesota PCA	Minimal, >125	No
NFA List	In 1998 Governor's Report <http://www.epa.state.oh.us/derr/vap/gov_rept/vapgov.pdf>	Ohio EPA VAP	Minimal, ~40	No
Haz. Site Inventory - "a" list	Remediation and Redevelopment Div <http://www.dnr.state.wi.us/org/aw/rr/archive/pubs/SW504.zip>	Wisconsin DNR	Minimal, >100	No
VCP Database	Texas VCP <http://www.tnrcc.state.tx.us/waste/pcd/vcp/vcpdb.zip>	TNRCC	Yes, 893	Yes
One Stop Shop GIS	Brownfields <http://209.150.161.6/emeryville>	City of Emeryville, CA	Yes, >200	Yes
ECSI List	Site Assessment Program <http://www.deq.state.or.us/wmc/cleanup/ecsintro.htm>	Oregon DEQ	Minimal, 2000	No
Haz. Site Inventory	Waste Management and Cleanup Div <http://www.deq.state.or.us/wmc/cleanup/inv-list.htm>	Oregon DEQ	Yes, 214	Yes
Facility/Site ID System	Information Services Section <www3.dis.wa.gov\FSWEB\>	Washington DOE	Yes, 512 in VCP	No

Persons not contacted for this paper	Purpose	Name	Affiliation	Phone
Redevelopment Projects	Chicago Office	Mr. Scott Anderson	Black and Veatch	312-683-7834
Redevelopment Projects	Kansas City Office	Mr. Mark Snyder	Black and Veatch, R7	913-458-6526
Firm	Main Office	No contact	Roy F. Weston	1-800-7Weston
Firm	Northeast Region	No contact	Maxy	800-695-7771
Firm	Main Office	No contact	URS Greiner	415-774-2700
Firm	MA Office/Env. Consulting for KEERA	William Duvel, Ph.D.	ENSR-KEERA	978-635-9500
Firm	Main Office	No contact	Ogden Environmental	703-488-3700
AAPA Session Participant	Port/Harbor Brownfields	Ms. Helene Takemoto	USACE-Honolulu	808-438-6931
AAPA Session Participant	ARCADIS Geraghty & Miller	Mr. Steve Brusee	ARCADIS	510-233-3200

Table A-3. Funding

City	Site	Ownership	Site Assessment Funding	Comments
Publicly owned properties (65)				
Bridgeport, CT	Jenkins Isle/Bluefish ballpark	City	City -pilot -EDA/PPP	$8-$9 million PPP funded 7 Bridgeport sites
Danbury, CT	Kohanza Brook/Barnum Court	City	City -pilot	
Danbury, CT	Mallory Hat Factory	City	City -pilot	
Middletown, CT	Portland Chemical	City	City -pilot	
Middletown, CT	Peterson Oil Company	City	City	
Norwich, CT	Marina	City	City	
Lawrence, MA	Oxford Paper Company	City	State	
Lawrence, MA	Atlantic Power	City	City -pilot	
Lowell, MA	Baseball Stadium	City	City -pilot	
Lowell, MA	Tsongas Arena	City	City -pilot	
Lynn, MA	Beacon Chevrolet	City	City -pilot	
Buffalo, NY	Hanna Furnace/Union Ship Canal	City	City -State bond, City -pilot	
Buffalo, NY	Squaw Isl. USACE dredge disposal area	City	City -USACE	Wetlands creation project
Glen Cove, NY	Captains Cove Condominiums	City	State Sfund, City -State bond, City -pilot	
Ogdensburg, NY	Municipal Arena	City	State DOT, VCP, City -pilot	
Ogdensburg, NY	Diamond International Site	City	City -pilot	
Ogdensburg, NY	Lighthouse Point	City	City -pilot	
Ogdensburg, NY	Former tank farm	City	City -pilot	
Cape Charles/Northampton County, VA	Town Parcel	City/County	City/County -pilot	
Pittsburgh, PA	LTV South Side Steel works	EDA	VCP -EDA	
Pittsburgh, PA	Washington's Landing/Herr Island parcels 1, 2a, 2b, 3, 4, 5, 6, 7, 8	EDA	VCP -EDA	
Pittsburgh, PA	Washington's Landing/Herr Island parcels 10, 11south, 12	EDA	VCP -EDA	
Pittsburgh, PA	Duquesne Slag - 9 mile run	EDA	VCP -EDA/pilot	EDA (Urban Redev Auth) received pilot
Pittsburgh, PA	Pittsburgh Tech Center	EDA	VCP -EDA	
East Point, GA	Cotton Mill waste lagoon	City	State (now City -pilot, State)	
East Moline, IL	City landfill	City	City -pilot	
Kalamazoo, MI	Auto Ion Area, Mills Street	City (2 non-NPL parcels)	City -pilot, State-EPA	
Kalamazoo, MI	Riverfront BRI Site (CP South)	City	State-EPA	
St. Joseph, MI	Auto Specialties Site (parcel 1S)	City	City -State bond, EDA -pilot	EDA (Cornerstone Alliance) received pilot
Benton Harbor, MI	Lk MI Coll Tech Center	EDA	EDA -State-EPA, City -CDBG	
Traverse City, MI	Traverse City Iron Works	City	City -State bond, EDA	Grant from state bond paid for char + rem
Southern Ohio Port Authority, OH	Empire Detroit Steel Mill (VCP 16.8 ac)	Port Authority	VCP, Port Authority	
Southern Ohio Port Authority, OH	Empire Detroit Steel Mill (3 parcels)	Port Authority	Port Authority -pilot, VCP	
Kenosha, WI	Harborpark Center - Fmr Chrysler	City	City -pilot	
Kansas City, MO	Riverfront Park Port Authority Project	City, Port Authority	City, Port Auth -State, -USACE	Wideranging plans include park, aquarium, commercial development
New Orleans, LA	Saratoga Street	City	City -pilot, ESC demo project	
New Orleans, LA	Powers Junction	City	City -pilot, ESC demo project	
New Orleans, LA	Hendree Court	City	City -pilot, ESC demo project	

City	Site	Ownership	Site Assessment Funding	Comments
Shreveport, LA	Fairgrounds parcels	City	City -pilot	
Richmond, CA	Terminal I - Petromark	City	City -pilot, seeking TBA	
Richmond, CA	Marina Bay Parcels - WWII shipyards	EDA	City -EDA	
Richmond, CA	Point Molate Naval Fuel Station	U.S. Navy	Navy BRAC	Former base undergoing redevelopment
Stockton, CA	Weber Block	City	City -pilot	
San Francisco, CA	Pacific Bell Park	City	City - State, VCP	
Falls City, OR	Atlas Mill	City	EPA TBA - State	State conducted work using EPA grant
Harlan, OR	Old Harlan Mill	County	EPA TBA - State	State conducted work using EPA grant
Portland, OR	North Marine Drive	City	City -Federal DOT/FHWA	Unique case of FHWA funds used on Bf's
Portland, OR	Port of Portland Terminal 4	Port Authority	Port Auth, State	EPA-DEQ areawide sediment sampling
Portland, OR	Portland Shipyard	Port Authority	Port Auth, State	EPA-DEQ areawide sediment sampling
White City, OR	Former Whetstone Landfill	City of Medford	EPA TBA - State	State conducted work using EPA grant
Bellingham, WA	Olivine Property	Port Authority	Port Auth - pilot, VCP, state	EPA and State conducted areawide sed
Bellingham, WA	Roeder Avenue Landfill	Port Authority	Port Auth - pilot, VCP -owner	assessment after initial adjacent NPL work
Norwich, CT	Falls Ave. Mill, Thames River	City	City -pilot	
Yonkers, NY	Alexander Street Waterfront (22 ac)	City	City -pilot	
Clearwater, FL	Stevenson Creek junkyard	City	City -pilot, USACE	
Kalamazoo, MI	Consumers Power North	City	State	State gives Brownfield redevelopment authority money to reimburse developers for environmental expenses
Benton Harbor, MI	Former Superior Steel	City seeking to acquire	State, EDA, CDBG	All St. Joe/Benton Harbor sites part of wider Edgewater, Graham Avenue redevelopment plans
Benton Harbor, MI	Malleable Site	City seeking to acquire	State, EDA, CDBG	
Benton Harbor, MI	CSX Railway Site	City seeking to acquire	State, EDA, CDBG	
Girard, OH	Ohio Leather Company	City	City - pilot	
Omaha, NE	City Dock Board	City, USACE	City -pilot, USACE	
Omaha, NE	Freedom Park Landfill	City	City	
Cedar Rapids, IA	Meat rendering and other facilities	City	City -pilot	
Portland, OR	Willamette Cove Park	City (Transit Auth)	City	Area to be preserved as open space
Portland, OR	U.S. Government Moorings	USACE	VCP - USACE, State	
Privately owned properties (38)				
Chicopee, MA	Dac Hur/Hamden Steel	Private	VCP	
Lawrence, MA	Lawrence Textile	Private	VCP	
Lawrence, MA	Everett Mills	Private	City - pilot	
Buffalo, NY	LTV Steel hydroponic tomato	Private	VCP -pilot	
St. Joseph, MI	Whirlpool Property	Private	VCP - owner	
Tallmadge, OH	Simcox Steel and Grinding Co.	Private	VCP	
Toledo, OH	Chevron Refinery	Private	VCP - operator	
Baytown, TX	EPC - Nitrogen Benzene Transfer Station	Private	VCP - operator	Rejected from VCP
Channelview, TX	Hutchison-Hayes International	Private	VCP - purchaser	
Channelview, TX	Zapata Offshore Property	Private	VCP - operator	Withdrew from VCP
Channelview, TX	KOCH Refining Terminal	Private	VCP - operator	

City	Site	Ownership	Site Assessment Funding	Comments
Corpus Christi, TX	Keeper's Locker, Inc.	Private	VCP - seller	
Galena Park, TX	Woodhouse Terminal - Port of Houston	Private	VCP - operator	
Galveston, TX	Tatsumi USA/Todd Shipyard Facility	Private	VCP - purchaser	Withdrew from VCP
Galveston, TX	SPTCo Galveston Wharves Site	Private	VCP - operator	
Houston, TX	Lafarge - Clinton Drive Facility	Private	VCP - operator	
Houston, TX	Unoccupied Sandblasting/Painting Site	Private	VCP - operator	
Houston, TX	Foster Products Corporation	Private	VCP - operator	
Ingleside, TX	Ingleside Offshore Services Property	Private	VCP - operator	
Lynchburg, TX	Channel Shipyard, Inc.	Private	VCP - operator	
Port Isabel, TX	Amerada Hess Refinery	Private	VCP - operator	
Omaha, NE	ASARCO	Private	VCP - operator	Smelter closed after ASARCO lost CWA lawsuit.
Portland, OR	Triangle North Portland Yard/Riedel	Private	VCP - purchaser, State	State formed cooperative agreements with
Portland, OR	GASCO/NWNG	Private	VCP - operator, State	several industries along Willamette River in
Portland, OR	Elf Atochem	Private	VCP - operator, State	an attempt to avoid NPL status for the
Portland, OR	Time Oil Company	Private	VCP - operator, State	Portland Harbor area. State and EPA have
Portland, OR	Mobil Oil	Private	VCP - operator, State	performed areawide sediment assessment
Portland, OR	Gunderson	Private	VCP - operator, State	
Portland, OR	Moody Avenue Property	Private	VCP - purchaser	
DuPont, WA	Former Du Pont Explosives Plant	Private	VCP - seller	
Seattle, WA	Lake Union Steam Plant	Private	VCP - purchaser	
Ketchican, AK	Pulp Mill	Private	VCP - owner, City -pilot	
Chicopee, MA	Foundry w/ lead contamination	Private	VCP - purchaser	
Glen Cove, NY	Bona-Fide Ready Mix	Private	VCP, State	
Glen Cove, NY	A-1 Carting	Private	VCP, State	
Glen Cove, NY	Gladsky Marine Salvage	Private	VCP, State	
Glen Cove, NY	Hawkins Cove (Doxey)	Private	VCP, State	
Hennepin County, MN	Chemical Marketing Corporation	Private	State Sfund - pilot	
Indeterminate Ownership (13)				These cities are still in the process of selecting sites to address with their available funds
Lowell, MA	Davison Street Lots	Indeterminate	City - VCP	
New Bedford, MA	Sites to be determined	Indeterminate	City -pilot, addtl state, fed projects	
Charleston, SC	Sites to be determined	Indeterminate	EDA -pilot	
Jacksonville, FL	Sites to be determined	Indeterminate	City -pilot	
Waukegan, IL	Madison Street properties	Indeterminate	City -pilot	
Muskegon, MI	Shoreline Project - multiple properties	Indeterminate	State bond	
Youngstown, OH	Six mile riparian corridor	Indeterminate	City -pilot	
Youngstown, OH	34 acre industrial park	Indeterminate	City -pilot	
Youngstown, OH	40-acre res/light commercial	Indeterminate	City -pilot	
Youngstown, OH	29-acre vacant ind park	Indeterminate	City -pilot	
Youngstown, OH	30-acre former steel mill	Indeterminate	City -pilot	
Coralville, IA	Iowa River Power Plant/Assoc. Parcels	Indeterminate	City -pilot	
Tacoma, WA	Thea Foss Wtwy - multiple properties	Indeterminate	EDA -pilot	

City	Site	Ownership	Site Assessment Funding	Comments
Key				
pilot - EPA National Brownfields Assessment pilot				
TBA - EPA Targeted Brownfields Assessment				
ESC - EPA funded Expedited Site Characterization				
CDBG - Federal Community Development Block Grant				
USACE - U.S. Army Corps of Engineers				
DOT - Department of Transportation (State/Federal noted)				
FWHA - Federal Highway Administration				
BRAC - Base Realignment and Closure Commission				
VCP - State Voluntary Cleanup Program (for funding, represents tax credits and reimbursements resulting from program enrollment)				
State - Agency grant funds paid for assessment				
State bond (NY, MI only) - State environmental bond funds used				
State Sfund - Previous characterization work for state superfund purposes				
EDA -Local Economic Development or Urban Redevelopment Authority				
PPP -Public/Private Partnership				
EPA - EPA Regional Superfund Program Grant to the State				
Items following dashes - represent primary funding sources				
i.e. "City -pilot" denotes that while the city actually paid for the assessment, the federal pilot served as the primary funding source.				

Table A-4. Progress

City	Site	Pilot Start or VCP entry	Progress	Media Sampled		
				Soils	Gwater	Aq Sed
Publicly owned properties (65)						
Bridgeport, CT	Jenkins Isle/Bluefish ballpark	*Jun-94*	phase II complete	x		
Danbury, CT	Kohanza Brook/Barnum Court	Jul-97	phase II complete	x	x	x
Danbury, CT	Mallory Hat Factory	Jul-97	phase II complete	x	x	x
Middletown, CT	Portland Chemical		phase II complete	x		
Middletown, CT	Peterson Oil Company	Jul-98	phase II complete	x	x	
Norwich, CT	Marina		phase II complete	x	x	
Lawrence, MA	Oxford Paper Company	*Mar-96*	phase II complete	x		
Lawrence, MA	Atlantic Power	*Mar-96*	phase II complete	x		
Lowell, MA	Baseball Stadium	*Jan-96*	phase II complete	x		
Lowell, MA	Tsongas Arena	*Jan-96*	phase II complete	x		
Lynn, MA	Beacon Chevrolet	Apr-97	phase II complete	x		
Buffalo, NY	Hanna Furnace/Union Ship Canal	*Sep-95*	phase II complete	x	x	x
Buffalo, NY	Squaw Isl. USACE dredge disposal area		phase II complete	x	x	x
Glen Cove, NY	Captains Cove Condominiums	Jun-97	phase II complete	x	x	x
Ogdensburg, NY	Municipal Arena	May-98	phase II complete	x	x	
Ogdensburg, NY	Diamond International Site	May-98	phase II complete	x	x	
Ogdensburg, NY	Lighthouse Point	May-98	phase II complete	x	x	
Ogdensburg, NY	Former tank farm	May-98	phase II complete	x	x	
Cape Charles/Northampton County, VA	Town Parcel	*Sep-95*	phase II complete	x		
Pittsburgh, PA	LTV South Side Steel works	*Feb-95*	phase II complete	x	x	
Pittsburgh, PA	Washington's Landing/Herr Island parcels 1, 2a, 2b, 3, 4, 5, 6, 7, 8	*Feb-95*	phase II complete	x	x	
Pittsburgh, PA	Washington's Landing/Herr Island parcels 10, 11south, 12	*Feb-95*	phase II complete	x	x	
Pittsburgh, PA	Duquesne Slag - 9 mile run	*Feb-95*	phase II complete	x		x
Pittsburgh, PA	Pittsburgh Tech Center	*Feb-95*	phase II complete	x	x	
East Point, GA	Cotton Mill waste lagoon	Jul-98	phase II complete	x	x	
East Moline, IL	City landfill	Jul-98	phase II complete	x	x	
Kalamazoo, MI	Auto Ion Area, Mills Street	*Oct-96*	phase II complete	x	x	
Kalamazoo, MI	Riverfront BRI Site (CP South)	*Oct-96*	phase II complete	x	x	
St. Joseph, MI	Auto Specialties Site (parcel 1S)	Jul-98	phase II complete	x	x	x
Benton Harbor, MI	Lk MI Coll Tech Center		phase II complete	x	x	

City	Site	Pilot Start or VCP entry	Progress	Media Sampled		
				Soils	Gwater	Aq Sed
Traverse City, MI	Traverse City Iron Works	1996	phase II complete	x		
Southern Ohio Port Authority, OH	Empire Detroit Steel Mill (VCP 16.8 ac)	Feb-96	phase II complete	x	x	
Southern Ohio Port Authority, OH	Empire Detroit Steel Mill (3 pilot parcels)	Jul-98	phase II complete	x	x	
Kenosha, WI	Harborpark Center - Fmr Chrysler	Jul-98	phase II complete	x		
Kansas City, MO	Riverfront Park Port Authority Project		phase II complete	x	x	x
New Orleans, LA	Saratoga Street	*Sep-95*	phase II complete	x	x	
New Orleans, LA	Powers Junction	*Sep-95*	phase II complete	x	x	
New Orleans, LA	Hendree Court	*Sep-95*	phase II complete	x	x	
Shreveport, LA	Fairgrounds parcels	*Sep-96*	phase II complete	x		
Richmond, CA	Terminal I - Petromark	*Sep-96*	phase II complete	x	x	
Richmond, CA	Marina Bay Parcels - WWII shipyards		phase II complete	x	x	
Richmond, CA	Point Molate Naval Fuel Station		phase II complete	x	x	
Stockton, CA	Weber Block	*Mar-96*	phase II complete	x	x	x
San Francisco, CA	Pacific Bell Park	1997	phase II complete	x		
Falls City, OR	Atlas Mill	*1997*	phase II complete	x		
Harlan, OR	Old Harlan Mill	*Apr-98*	phase II complete	x		x
Portland, OR	North Marine Drive		phase II complete	x		
Portland, OR	Port of Portland Terminal 4	Jul-98	phase II complete	x	x	x
Portland, OR	Portland Shipyard	1989	phase II complete	x		x
White City, OR	Former Whetstone Landfill	*Nov-96*	phase II complete	x	x	x
Bellingham, WA	Olivine Property	*Sep-96*	phase II complete	x	x	
Bellingham, WA	Roeder Avenue Landfill	*Sep-96*	phase II complete	x	x	
Norwich, CT	Falls Ave. Mill, Thames River	May-98	phase II incomplete			
Yonkers, NY	Alexander Street Waterfront (22 ac)	May-98	phase II incomplete			
Clearwater, FL	Stevenson Creek junkyard	Sep-96	phase II incomplete			
Kalamazoo, MI	Consumers Power North	*Oct-96*	phase II incomplete			
Benton Harbor, MI	Former Superior Steel		phase II incomplete			
Benton Harbor, MI	Malleable Site		phase II incomplete			
Benton Harbor, MI	CSX Railway Site		phase II incomplete			
Girard, OH	Ohio Leather Company	Mar-99	phase II incomplete			
Omaha, NE	City Dock Board	Jul-98	phase II incomplete			
Omaha, NE	Freedom Park Landfill	Jul-98	phase II incomplete			
Cedar Rapids, IA	Meat rendering and other facilities	Jul-98	phase II incomplete			
Portland, OR	Willamette Cove Park		phase II incomplete			
Portland, OR	U.S. Government Moorings	Jun-98	phase II incomplete			

City	Site	Pilot Start or VCP entry	Progress	Media Sampled		
				Soils	Gwater	Aq Sed
Privately owned properties (38)						
Chicopee, MA	Dac Hur/Hamden Steel		phase II complete	x		
Lawrence, MA	Lawrence Textile	*Mar-96*	phase II complete	x		
Lawrence, MA	Everett Mills	*Mar-96*	phase II complete	x		
Buffalo, NY	LTV Steel hydroponic tomato	*Sep-95*	phase II complete	x		
St. Joseph, MI	Whirlpool Property		phase II complete	x		
Tallmadge, OH	Simcox Steel and Grinding Co.		phase II complete	x		
Toledo, OH	Chevron Refinery		phase II complete	x		
Baytown, TX	EPC - Nitrogen Benzene Transfer Station	01-Aug-97	phase II complete	x		
Channelview, TX	Hutchison-Hayes International	31-Oct-96	phase II complete	x		
Channelview, TX	Zapata Offshore Property	18-Mar-97	phase II complete	x	x	
Channelview, TX	KOCH Refining Terminal	24-Jul-97	phase II complete	x		
Corpus Christi, TX	Keeper's Locker, Inc.	27-Jun-97	phase II complete	x		
Galena Park, TX	Woodhouse Terminal - Port of Houston	10-Jan-96	phase II complete	x		
Galveston, TX	Tatsumi USA/Todd Shipyard Facility	30-Aug-96	phase II complete	x		
Galveston, TX	SPTCo Galveston Wharves Site	11-May-99	phase II complete	x		
Houston, TX	Lafarge - Clinton Drive Facility	13-Aug-96	phase II complete	x		
Houston, TX	Unoccupied Sandblasting/Painting Site	14-Nov-96	phase II complete	x	x	
Houston, TX	Foster Products Corporation	09-Jun-99	phase II complete	x	x	
Ingleside, TX	Ingleside Offshore Services Property	10-Mar-97	phase II complete	x		
Lynchburg, TX	Channel Shipyard, Inc.	13-Aug-96	phase II complete	x		
Port Isabel, TX	Amerada Hess Refinery	06-Mar-97	phase II complete	x		
Omaha, NE	ASARCO	1997	phase II complete	x	x	
Portland, OR	Triangle North Portland Yard/Riedel	May-97	phase II complete	x		x
Portland, OR	GASCO/NWNG	Dec-93	phase II complete	x	x	x
Portland, OR	Elf Atochem	Aug-98	phase II complete	x	x	x
Portland, OR	Time Oil Company	1991	phase II complete (multiple investigations)	x	x	
Portland, OR	Mobil Oil	Jan-92	phase II complete	x	x	
Portland, OR	Gunderson	Apr-94	phase II complete (multiple investigations)	x	x	
Portland, OR	Moody Avenue Property	Aug-89	phase II complete	x		

City	Site	Pilot Start or VCP entry	Progress	Media Sampled		
				Soils	Gwater	Aq Sed
DuPont, WA	Former Du Pont Explosives Plant		phase II complete	x	x	
Seattle, WA	Lake Union Steam Plant		phase II complete	x		
Ketchican, AK	Pulp Mill	*Sep-97*	phase II complete	x		
Chicopee, MA	Foundry w/ lead contamination		phase II incomplete			
Glen Cove, NY	Bona-Fide Ready Mix		phase II incomplete			
Glen Cove, NY	A-1 Carting		phase II incomplete			
Glen Cove, NY	Gladsky Marine Salvage		phase II incomplete			
Glen Cove, NY	Hawkins Cove (Doxey)		phase II incomplete			
Hennepin County, MN	Chemical Marketing Corporation	May-98	phase II incomplete			
Indeterminate Ownership (13)						
Lowell, MA	Davison Street Lots	*Jan-96*	phase II incomplete			
New Bedford, MA	Sites to be determined	*Apr-97*	phase II incomplete			
Charleston, SC	Sites to be determined	May-98	phase II incomplete			
Jacksonville, FL	Sites to be determined	*Apr-97*	phase II incomplete			
Waukegan, IL	Madison Street properties	Jul-98	phase II incomplete			
Muskegon, MI	Shoreline Project - multiple properties		phase II incomplete			
Youngstown, OH	Six mile riparian corridor	Jul-98	phase II incomplete			
Youngstown, OH	34 acre industrial park	Jul-98	phase II incomplete			
Youngstown, OH	40-acre res/light commercial	Jul-98	phase II incomplete			
Youngstown, OH	29-acre vacant ind park	Jul-98	phase II incomplete			
Youngstown, OH	30-acre former steel mill	Jul-98	phase II incomplete			
Coralville, IA	Iowa River Power Plant/Assoc. Parcels	Jul-98	phase II incomplete			
Tacoma, WA	Thea Foss Wtwy - multiple properties	May-97	phase II incomplete			

Key

Federal pilots whose funding has run out are listed in italics. Pilot funding typically lasts for 2 years but may be extended. Existing pilots and VCP participants appear in standard type. To identify which sites received federal demonstration pilot grants, refer to "Funding".

Media sampled data represents only best available information.

Table A-5. Tool data

City	Site	Known Field-Portable Tools
Assessed public properties (52)		
Bridgeport, CT	Jenkins Isle/Bluefish ballpark	None
Danbury, CT	Kohanza Brook/Barnum Court	PID
Danbury, CT	Mallory Hat Factory	
Middletown, CT	Portland Chemical	
Middletown, CT	Peterson Oil Company	
Norwich, CT	Marina	None
Lawrence, MA	Oxford Paper Company	
Lawrence, MA	Atlantic Power	
Lowell, MA	Baseball Stadium	
Lowell, MA	Tsongas Arena	
Lynn, MA	Beacon Chevrolet	PID+FID
Buffalo, NY	Hanna Furnace/Union Ship Canal	None
Buffalo, NY	Squaw Isl. USACE dredge disposal area	
Glen Cove, NY	Captains Cove Condominiums	Soil gas samplers
Ogdensburg, NY	Municipal Arena	None
Ogdensburg, NY	Diamond International Site	None
Ogdensburg, NY	Lighthouse Point	None
Ogdensburg, NY	Former tank farm	None
Cape Charles/Northampton County, VA	Town Parcel	PID
Pittsburgh, PA	LTV South Side Steel works	None
Pittsburgh, PA	Washington's Landing/Herr Island parcels 1, 2a, 2b, 3, 4, 5, 6, 7, 8	None
Pittsburgh, PA	Washington's Landing/Herr Island parcels 10, 11south, 12	None
Pittsburgh, PA	Duquesne Slag - 9 mile run	Soil gas samplers
Pittsburgh, PA	Pittsburgh Tech Center	None
East Point, GA	Cotton Mill waste lagoon	PID
East Moline, IL	City landfill	None
Kalamazoo, MI	Auto Ion Area, Mills Street	
Kalamazoo, MI	Riverfront BRI Site (CP South)	
St. Joseph, MI	Auto Specialties Site (parcel 1S)	
Benton Harbor, MI	Lk MI Coll Tech Center	
Traverse City, MI	Traverse City Iron Works	
Southern Ohio Port Authority, OH	Empire Detroit Steel Mill (VCP 16.8 ac)	
Southern Ohio Port Authority, OH	Empire Detroit Steel Mill (3 parcels)	
Kenosha, WI	Harborpark Center - Fmr Chrysler	Soil gas samplers (CH4)
Kansas City, MO	Riverfront Park Port Authority Project	
New Orleans, LA	Saratoga Street	On site lab (GC w/ FID and ECD, XRF, Kit), Foxboro OVA-1000 PID
New Orleans, LA	Powers Junction	On site lab (GC w/ FID and ECD, XRF, Kit), Foxboro OVA-1000 PID
New Orleans, LA	Hendree Court	On site lab (GC w/ FID and ECD, XRF, Kit), Foxboro OVA-1000 PID
Shreveport, LA	Fairgrounds Parcels	PID
Richmond, CA	Terminal I - Petromark	Draeger tubes, PID, Gore Sorber soil gas sampler
Richmond, CA	Marina Bay Parcels - WWII shipyards	
Richmond, CA	Point Molate Naval Fuel Station	SCAPS-ROST, XRF, 3-D electromagnetic tool, Waterloo Profiler, Geoviz CPT fiberoptic GW monitoring, LIBS for metals
Stockton, CA	Weber Block	PID
San Francisco, CA	Pacific Bell Park	None
Falls City, OR	Atlas Mill	None
Harlan, OR	Old Harlan Mill	None
Portland, OR	North Marine Drive	
Portland, OR	Port of Portland Terminal 4	None
Portland, OR	Portland Shipyard	
White City, OR	Former Whetstone Landfill	None
Bellingham, WA	Olivine Property	PID

City	Site	Known Field-Portable Tools
Bellingham, WA	Roeder Avenue Landfill	PID
Private assessed properties (32)		
Chicopee, MA	Dac Hur/Hamden Steel	
Lawrence, MA	Lawrence Textile	
Lawrence, MA	Everett Mills	
Buffalo, NY	LTV Steel hydroponic tomato	
St. Joseph, MI	Whirlpool Property	HNU, others known but not reported
Tallmadge, OH	Simcox Steel and Grinding Co.	
Toledo, OH	Chevron Refinery	
Baytown, TX	EPC - Nitrogen Benzene Transfer Station	
Channelview, TX	Hutchison-Hayes International	
Channelview, TX	Zapata Offshore Property	OVA (soil vapor)
Channelview, TX	KOCH Refining Terminal	PID
Corpus Christi, TX	Keeper's Locker, Inc.	
Galena Park, TX	Woodhouse Terminal - Port of Houston	
Galveston, TX	Tatsumi USA/Todd Shipyard Facility	
Galveston, TX	SPTCo Galveston Wharves Site	
Houston, TX	Lafarge - Clinton Drive Facility	
Houston, TX	Unoccupied Sandblasting/Painting Site	
Houston, TX	Foster Products Corporation	GasTech GT400 Soil gas monitor (CH4), PID
Ingleside, TX	Ingleside Offshore Services Property	
Lynchburg, TX	Channel Shipyard, Inc.	
Port Isabel, TX	Amerada Hess Refinery	
Omaha, NE	ASARCO	
Portland, OR	Triangle North Portland Yard/Riedel	
Portland, OR	GASCO/NWNG	
Portland, OR	Elf Atochem	
Portland, OR	Time Oil Company	
Portland, OR	Mobil Oil	
Portland, OR	Gunderson	
Portland, OR	Moody Avenue Property	
DuPont, WA	Former Du Pont Explosives Plant	On site lab (GC w/ FID and ECD, XRF, Kit), PID and other field screening tools
Seattle, WA	Lake Union Steam Plant	
Ketchican, AK	Pulp Mill	PID

Key

Field Screening tools

PID: Photoionization detector*
FID: Flame Ionization Detector (part of PID)
Draeger tubes
Soil gas monitors
HNU: Type of soil gas monitor
OVA: Type of soil gas monitor
CPT: Fiberoptic groundwater monitor
*- while still field screening devices, PIDs were invented in the 1970s

On-site Analysis tools

GC: Gas Chromatography unit
FID: Flame Ionization Detector (part of GC)
ECD: Electron Capture Detector (part of GC)
XRF: X-ray fluorescence spectrometry unit
Kit: Immunoassay Kit for a specific contaminant
SCAPS-ROST: Site Characterization and Analysis Penetrometer System-Rapid Optical Screening Tool
LIBS: Laser-induced spectroscopy

Table A-6. Contaminants

City	Site	Contaminants (Suspected in Italics)
Publicly owned properties (65)		
Bridgeport, CT	Jenkins Isle/Bluefish ballpark	
Danbury, CT	Kohanza Brook/Barnum Court	Metals, Hg, TPH plume from off-site
Danbury, CT	Mallory Hat Factory	Soil: Hg, asbestos, Pb, As. GW: TPH
Middletown, CT	Portland Chemical	Cl Solvents, VOCs, PCBs
Middletown, CT	Peterson Oil Company	BTEX, other hydrocarbons
Norwich, CT	Marina	
Lawrence, MA	Oxford Paper Company	Cl Solvents, dioxin, furans
Lawrence, MA	Atlantic Power	
Lowell, MA	Baseball Stadium	Coal tar ash
Lowell, MA	Tsongas Arena	Coal tar ash, TPH
Lynn, MA	Beacon Chevrolet	Soil, GW: PAH, TPH, metals
Buffalo, NY	Hanna Furnace/Union Ship Canal	Soil: SVOCs, inorganics, PCBs, VOCs. GW: Inorganics, VOCs. Sed: not tested.
Buffalo, NY	Squaw Isl. USACE dredge disposal area	VOCs, SVOCs, metals
Glen Cove, NY	Captains Cove Condominiums	Soil: PCBs, VOCs, inorganics. Sed: SVOCs, metals, phthalates
Ogdensburg, NY	Municipal Arena	
Ogdensburg, NY	Diamond International Site	Solvents, VOCs, SVOCs, asbestos
Ogdensburg, NY	Lighthouse Point	
Ogdensburg, NY	Former tank farm	TPH, metals
Cape Charles/Northampton County, VA	Town Parcel	
Pittsburgh, PA	LTV South Side Steel works	Soil: As, Cr, Ni, Pb, Zn, SVOCs, PCBs, TPH. GW: contaminated
Pittsburgh, PA	Washington's Landing/Herr Island parcels 1, 2a, 2b, 3, 4, 5, 6, 7, 8	No contamination
Pittsburgh, PA	Washington's Landing/Herr Island parcels 10, 11south, 12	Soil: VOC, SVOC, PCBs, PAHs
Pittsburgh, PA	Duquesne Slag - 9 mile run	Cr, metals, sewage discharge
Pittsburgh, PA	Pittsburgh Tech Center	Soil: FeCN plume at 25ft depth, tar
East Point, GA	Cotton Mill waste lagoon	VOCs, PCBs
East Moline, IL	City landfill	Soil: VOC, SVOC, PCBs, PAHs
Kalamazoo, MI	Auto Ion Area, Mills Street	CN, Cr
Kalamazoo, MI	Riverfront BRI Site (CP South)	TPH, metals
St. Joseph, MI	Auto Specialties Site (parcel 1S)	TPH, dissolved/undissolved metals, PAHs
Benton Harbor, MI	Lk MI Coll Tech Center	
Traverse City, MI	Traverse City Iron Works	Metals
Southern Ohio Port Authority, OH	Empire Detroit Steel Mill (VCP 16.8 ac)	Asbestos, Pb, metals, PCBs, petroleum
Southern Ohio Port Authority, OH	Empire Detroit Steel Mill (3 parcels)	
Kenosha, WI	Harborpark Center - Fmr Chrysler	Asbestos, PCBs
Kansas City, MO	Riverfront Park Port Authority Project	
New Orleans, LA	Saratoga Street	VOCs: BTEX, 1,2,4-trimethylbenzene; 2,3,5-trimethylbenzene; MTBE; TPH. SVOCs: PAH and diesel. PCBs, pesticides, dioxins, furans, and metals
New Orleans, LA	Powers Junction	VOCs: BTEX, 1,2,4-trimethylbenzene; 2,3,5-trimethylbenzene; MTBE; TPH. SVOCs: PAH and diesel. PCBs, pesticides, dioxins, furans, and metals
New Orleans, LA	Hendree Court	VOCs: BTEX, 1,2,4-trimethylbenzene; 2,3,5-trimethylbenzene; MTBE; TPH. SVOCs: PAH and diesel. PCBs, pesticides, dioxins, furans, and metals
Shreveport, LA	Fairgrounds parcels	TPH, VOCs
Richmond, CA	Terminal I - Petromark	VOCs, PCB, metals
Richmond, CA	Marina Bay Parcels - WWII shipyards	VOCs, metals, acids

City	Site	Contaminants (Suspected in Italics)
Richmond, CA	Point Molate Naval Fuel Station	TPH, metals, PCBs, solvents
Stockton, CA	Weber Block	
San Francisco, CA	Pacific Bell Park	Pb
Falls City, OR	Atlas Mill	As, Be, PAH, PCB, solvents, pesticides
Harlan, OR	Old Harlan Mill	Ba, Be, Cr, Mn, Ni, VOCs, SVOCs, TPH, pesticides, PCBs
Portland, OR	North Marine Drive	Pesticides
Portland, OR	Port of Portland Terminal 4	TPH, metals, PAHs
Portland, OR	Portland Shipyard	TPH, PCBs, TBT, metals, PAHs
White City, OR	Former Whetstone Landfill	Dioxin, benzo(b)fluoranthene, other PAH, metal, VOC
Bellingham, WA	Olivine Property	Soil: PAHs, VOCs, phthalates, TPH. GW: Cr. Sed in Bay: Hg, 4-methylphenol, phenol
Bellingham, WA	Roeder Avenue Landfill	Soil: VOCs, Pb, Zn, Cu. GW: Cr. Sed in Bay: Hg, 4-methylphenol, phenol
Norwich, CT	Falls Ave. Mill, Thames River	
Yonkers, NY	Alexander Street Waterfront (22 ac)	
Clearwater, FL	Stevenson Creek junkyard	Soil (suspected): VOCs, SVOCs, metals. Sed: PAHs, pesticides
Kalamazoo, MI	Consumers Power North	*TPH, metals*
Benton Harbor, MI	Former Superior Steel	Soil (suspected): Metals, acids, VOCs, SVOCs. GW: free TPH
Benton Harbor, MI	Malleable Site	Prev baseline survey uncovered TCE plume, FeCN, Hg, Cr
Benton Harbor, MI	CSX Railway Site	
Girard, OH	Ohio Leather Company	
Omaha, NE	City Dock Board	*TPH, PCBs, metals, PAHs*
Omaha, NE	Freedom Park Landfill	*VOCs, SVOCs, metals*
Cedar Rapids, IA	Meat rendering and other facilities	
Portland, OR	Willamette Cove Park	Prev baseline survey disc metals, tributyltin, PAHs, PCBs
Portland, OR	U.S. Government Moorings	Prev baseline survey disc PAHs, pesticides, metals, tributyltin
Privately owned properties (38)		
Chicopee, MA	Dac Hur/Hamden Steel	TPH plume into river
Lawrence, MA	Lawrence Textile	
Lawrence, MA	Everett Mills	
Buffalo, NY	LTV Steel hydroponic tomato	TPH
St. Joseph, MI	Whirlpool Property	Pb, Cr, As
Tallmadge, OH	Simcox Steel and Grinding Co.	
Toledo, OH	Chevron Refinery	
Baytown, TX	EPC - Nitrogen Benzene Transfer Station	TPH
Channelview, TX	Hutchison-Hayes International	TPH, metals
Channelview, TX	Zapata Offshore Property	
Channelview, TX	KOCH Refining Terminal	BTEX, TPH
Corpus Christi, TX	Keeper's Locker, Inc.	BTEX, TPH
Galena Park, TX	Woodhouse Terminal - Port of Houston	TPH
Galveston, TX	Tatsumi USA/Todd Shipyard Facility	
Galveston, TX	SPTCo Galveston Wharves Site	SVOCs
Houston, TX	Lafarge - Clinton Drive Facility	TPH, PAHs, metals
Houston, TX	Unoccupied Sandblasting/Painting Site	VOCs, metals, TCE plume
Houston, TX	Foster Products Corporation	Migrated TCE plume from Sandblasting site, metals, VOCs
Ingleside, TX	Ingleside Offshore Services Property	BTEX, TPH
Lynchburg, TX	Channel Shipyard, Inc.	TPH, chlorinated solvents
Port Isabel, TX	Amerada Hess Refinery	TPH, benzene, metals

City	Site	Contaminants (Suspected in Italics)
Omaha, NE	ASARCO	Soil (susp): Metals, PAHs, PCBs. Sed (known): Pb (to 14000ppm), As, Hg, Ag, Zn, PCB, dieldrin
Portland, OR	Triangle North Portland Yard/Riedel	PAHs, PCBs, TBT, TPH, VOCs, metals
Portland, OR	GASCO/NWNG	TPH and oil gasification byproducts
Portland, OR	Elf Atochem	DDT, DDD, DDE, chlorobenzene
Portland, OR	Time Oil Company	PCP
Portland, OR	Mobil Oil	TPH
Portland, OR	Gunderson	Metals, PCBs, TCA, toluene, TPH
Portland, OR	Moody Avenue Property	DDT, DDE, DDD, PAH, Pb, PCBs, TPH
DuPont, WA	Former Du Pont Explosives Plant	Pb, TPH, PCBs, VOCs, SVOCs, metals
Seattle, WA	Lake Union Steam Plant	Asbestos, TPH, PCBs, Pb
Ketchican, AK	Pulp Mill	TPH, metals, VOCs
Chicopee, MA	Foundry w/ lead contamination	*Pb (known), Metals, PCBs*
Glen Cove, NY	Bona-Fide Ready Mix	
Glen Cove, NY	A-1 Carting	
Glen Cove, NY	Gladsky Marine Salvage	
Glen Cove, NY	Hawkins Cove (Doxey)	
Hennepin County, MN	Chemical Marketing Corporation	*TPH, solvents*
Indeterminate Ownership (13)		
Lowell, MA	Davison Street Lots	
New Bedford, MA	Sites to be determined	
Charleston, SC	Sites to be determined	
Jacksonville, FL	Sites to be determined	
Waukegan, IL	Madison Street properties	
Muskegon, MI	Shoreline Project - multiple properties	Soils: varies by property. Previous sediment survey in Muskegon Lake: Metals, PAHs, PCBs
Youngstown, OH	Six mile riparian corridor	
Youngstown, OH	34 acre industrial park	
Youngstown, OH	40-acre res/light commercial	
Youngstown, OH	29-acre vacant ind park	
Youngstown, OH	30-acre former steel mill	*Metals, acids, VOCs, SVOCs*
Coralville, IA	Iowa River Power Plant/Assoc. Parcels	
Tacoma, WA	Thea Foss Wtwy - multiple properties	

Key

Contaminant data usually reflect soil media unless otherwise noted.
A few sites reported contaminants in all media - use professional judgement.
See matrix key for contaminant abbreviations.

S: soil
GW: groundwater
Sed: aqueous sediment

Table A-7. Remediation

City	Site	Remediation Stage, Method
Publicly owned properties (65)		
Bridgeport, CT	Jenkins Isle/Bluefish ballpark	complete, cap
Danbury, CT	Kohanza Brook/Barnum Court	planned, phytoremediation demo
Danbury, CT	Mallory Hat Factory	
Middletown, CT	Portland Chemical	
Middletown, CT	Peterson Oil Company	planned phase III
Norwich, CT	Marina	complete, dig/haul
Lawrence, MA	Oxford Paper Company	
Lawrence, MA	Atlantic Power	
Lowell, MA	Baseball Stadium	complete, cap
Lowell, MA	Tsongas Arena	complete, cap
Lynn, MA	Beacon Chevrolet	planned phase III
Buffalo, NY	Hanna Furnace/Union Ship Canal	planned
Buffalo, NY	Squaw Isl. USACE dredge disposal area	removal, natural recovery with wetlands
Glen Cove, NY	Captains Cove Condominiums	in progress, $4.9M state superfund, using innovative technologies
Ogdensburg, NY	Municipal Arena	
Ogdensburg, NY	Diamond International Site	in progress, soil removal
Ogdensburg, NY	Lighthouse Point	
Ogdensburg, NY	Former tank farm	
Cape Charles/Northampton County, VA	Town Parcel	planning stages
Pittsburgh, PA	LTV South Side Steel works	complete, cap and GW treat
Pittsburgh, PA	Washington's Landing/Herr Island parcels 1, 2a, 2b, 3, 4, 5, 6, 7, 8	none needed
Pittsburgh, PA	Washington's Landing/Herr Island parcels 10, 11south, 12	complete, cap, on site CDF
Pittsburgh, PA	Duquesne Slag - 9 mile run	planned, includes wetlands for stream
Pittsburgh, PA	Pittsburgh Tech Center	none needed
East Point, GA	Cotton Mill waste lagoon	
East Moline, IL	City landfill	
Kalamazoo, MI	Auto Ion Area, Mills Street	
Kalamazoo, MI	Riverfront BRI Site (CP South)	in progress
St. Joseph, MI	Auto Specialties Site (parcel 1S)	complete, dig/haul
Benton Harbor, MI	Lk MI Coll Tech Center	complete, dig/haul, bldg as cap
Traverse City, MI	Traverse City Iron Works	
Southern Ohio Port Authority, OH	Empire Detroit Steel Mill (VCP 16.8 ac)	complete, dig/haul, NFA
Southern Ohio Port Authority, OH	Empire Detroit Steel Mill (3 parcels)	
Kenosha, WI	Harborpark Center - Fmr Chrysler	complete, cap/dig
Kansas City, MO	Riverfront Park Port Authority Project	
New Orleans, LA	Saratoga Street	
New Orleans, LA	Powers Junction	
New Orleans, LA	Hendree Court	
Shreveport, LA	Fairgrounds parcels	complete, bldg cap/dig
Richmond, CA	Terminal I - Petromark	
Richmond, CA	Marina Bay Parcels - WWII shipyards	completed sections, dig/haul
Richmond, CA	Point Molate Naval Fuel Station	
Stockton, CA	Weber Block	planning stages
San Francisco, CA	Pacific Bell Park	complete, cdf, cap
Falls City, OR	Atlas Mill	complete, NFA
Harlan, OR	Old Harlan Mill	planning stages for UST, soils
Portland, OR	North Marine Drive	complete, cap with road
Portland, OR	Port of Portland Terminal 4	in progress - completed sediment dredging; interim bioslurping ongoing
Portland, OR	Portland Shipyard	planning stages for soil and sed
White City, OR	Former Whetstone Landfill	planning stages
Bellingham, WA	Olivine Property	planning stages

City	Site	Remediation Stage, Method
Bellingham, WA	Roeder Avenue Landfill	planning stages
Norwich, CT	Falls Ave. Mill, Thames River	
Yonkers, NY	Alexander Street Waterfront (22 ac)	
Clearwater, FL	Stevenson Creek junkyard	
Kalamazoo, MI	Consumers Power North	
Benton Harbor, MI	Former Superior Steel	
Benton Harbor, MI	Malleable Site	
Benton Harbor, MI	CSX Railway Site	
Girard, OH	Ohio Leather Company	
Omaha, NE	City Dock Board	
Omaha, NE	Freedom Park Landfill	
Cedar Rapids, IA	Meat rendering and other facilities	
Portland, OR	Willamette Cove Park	
Portland, OR	U.S. Government Moorings	
Privately owned properties (38)		
Chicopee, MA	Dac Hur/Hamden Steel	complete, GW pump/treat, Soil dig/haul
Lawrence, MA	Lawrence Textile	
Lawrence, MA	Everett Mills	
Buffalo, NY	LTV Steel hydroponic tomato	complete, dig/haul
St. Joseph, MI	Whirlpool Property	planned
Tallmadge, OH	Simcox Steel and Grinding Co.	complete, NFA
Toledo, OH	Chevron Refinery	complete, NFA
Baytown, TX	EPC - Nitrogen Benzene Transfer Statio	Rejected from VCP
Channelview, TX	Hutchison-Hayes International	complete, NFA
Channelview, TX	Zapata Offshore Property	Withdrew from VCP
Channelview, TX	KOCH Refining Terminal	
Corpus Christi, TX	Keeper's Locker, Inc.	
Galena Park, TX	Woodhouse Terminal - Port of Houston	complete, NFA
Galveston, TX	Tatsumi USA/Todd Shipyard Facility	Withdrew from VCP
Galveston, TX	SPTCo Galveston Wharves Site	
Houston, TX	Lafarge - Clinton Drive Facility	complete, NFA
Houston, TX	Unoccupied Sandblasting/Painting Site	
Houston, TX	Foster Products Corporation	
Ingleside, TX	Ingleside Offshore Services Property	
Lynchburg, TX	Channel Shipyard, Inc.	
Port Isabel, TX	Amerada Hess Refinery	in progress
Omaha, NE	ASARCO	proposed cap, no gw remediation
Portland, OR	Triangle North Portland Yard/Riedel	planning stages for soils
Portland, OR	GASCO/NWNG	
Portland, OR	Elf Atochem	planning stages for all media
Portland, OR	Time Oil Company	complete for soil: removal, slurry, incinerate
Portland, OR	Mobil Oil	in progress, SVE, sparging
Portland, OR	Gunderson	in progress, SVE
Portland, OR	Moody Avenue Property	complete, dig/haul, cap
DuPont, WA	Former Du Pont Explosives Plant	complete
Seattle, WA	Lake Union Steam Plant	complete
Ketchican, AK	Pulp Mill	
Chicopee, MA	Foundry w/ lead contamination	planned
Glen Cove, NY	Bona-Fide Ready Mix	
Glen Cove, NY	A-1 Carting	
Glen Cove, NY	Gladsky Marine Salvage	
Glen Cove, NY	Hawkins Cove (Doxey)	
Hennepin County, MN	Chemical Marketing Corporation	planned interim action, phytoremediation demo

City	Site	Remediation Stage, Method
Key Remediation listed is for soils unless otherwise noted. SVE - Soil Vapor Extraction CDF - Confined Disposal Facility NFA - post-remediation, No Further Action required agreement between owner, state		

Table A-8. Remediation

City	Site	Sediment sampling
Danbury, CT	Kohanza Brook Property	Complete, grab sampling
Danbury, CT	Mallory Hat Factory	Complete, grab sampling
Buffalo, NY	Hanna Furnace/Union Ship Canal	Ongoing, USACE channel work
Glen Cove, NY	Captains Cove Condominiums	Ongoing under separate USACE dredging program incorportated into redevelopment
Glen Cove, NY	Bona-Fide Ready Mix	Baseline areawide sed assess in channel, ongoing USACE work
Glen Cove, NY	A-1 Carting	Baseline areawide sed assess in channel, ongoing USACE work
Glen Cove, NY	Gladsky Marine Salvage	Baseline areawide sed assess in channel, ongoing USACE work
Glen Cove, NY	Hawkins Cove (Doxey)	Baseline areawide sed assess in channel, ongoing USACE work
Ogdensburg, NY	Diamond International Site	Planned, applied for funding
Pittsburgh, PA	Duquesne Slag - 9 mile run	Completed, grab and core
Clearwater, FL	Stevenson Creek junkyard	Planned, USACE channel work
Kalamazoo, MI	Riverfront BRI Site (CP South)	Completed under Superfund investigation of Kalamazoo River, USACE work also ongoing
Omaha, NE	ASARCO	Nearshore baseline grab sampling completed by owner
Kansas City, MO	Riverfront Port Authority Park Project	USACE areawide assessment
Stockton, CA	Weber Block	Completed, grab and core sampling
Harlan, OR	Old Harlan Mill	Completed, grab and core sampling
Portland, OR	Willamette Cove	ODEQ investigation - areawide multimethod sediment assessment
Portland, OR	U.S. Government Moorings	ODEQ investigation - areawide multimethod sediment assessment
Portland, OR	Triangle North Portland Yard/Riedel	ODEQ investigation - areawide multimethod sediment assessment
Portland, OR	Port of Portland Terminal 4	ODEQ investigation - areawide multimethod sediment assessment
Portland, OR	GASCO/NWNG	ODEQ investigation - areawide multimethod sediment assessment
Portland, OR	Elf Atochem	ODEQ investigation - areawide multimethod sediment assessment
Portland, OR	Portland Shipyard	ODEQ investigation - areawide multimethod sediment assessment
Portland, OR	Time Oil Company	ODEQ investigation - areawide multimethod sediment assessment
Portland, OR	Mobil Oil	ODEQ investigation - areawide multimethod sediment assessment
Portland, OR	Gunderson	ODEQ investigation - areawide multimethod sediment assessment
Portland, OR	Linnton Oil Fire Training Grounds	ODEQ investigation - areawide multimethod sediment assessment
White City, OR	Former Whetstone Landfill	Completed, grab sampling
Bellingham, WA	Olivine Property	Bellingham Bay Pilot - areawide sediment assessment
Bellingham, WA	Roeder Avenue Landfill	Bellingham Bay Pilot - areawide sediment assessment
Seattle, WA	Lake Union Steam Plant	Completed
Tacoma, WA	Thea Foss Wtwy - multiple properties	Completed under Superfund investigation of channel and bay
	Known sediment non-samplers	
Lynn, MA	Beacon Chevrolet	
Pittsburgh, PA	LTV South Side Steel works	
Pittsburgh, PA	Washington's Landing/Herr Island parcels 1, 2a, 2b, 3, 4, 5, 6, 7, 8	
Pittsburgh, PA	Washington's Landing/Herr Island parcels 10, 11south, 12	
Pittsburgh, PA	Pittsburgh Tech Center	
East Point, GA	Cotton Mill waste lagoon	
East Moline, IL	City landfill	
St. Joseph, MI*	Auto Specialties Site	* - Corps may assess in St. Joseph if their dredging project linked to
St. Joseph, MI*	Whirlpool Property	ongoing shoreline redevelopment is approved
St. Joseph, MI*	Former Superior Steel	
St. Joseph, MI*	Malleable Site	
St. Joseph, MI*	CSX Railway Site	
New Orleans, LA	Saratoga Street	
New Orleans, LA	Powers Junction	
New Orleans, LA	Hendree Court	
Shreveport, LA	Fairgrounds Parcels	
Channelview, TX	Zapata Offshore Property	
Richmond, CA	Terminal I - Petromark	
San Francisco, CA	Pacific Bell Park	
Falls City, OR	Atlas Mill	
Portland, OR	North Marine Drive	
Portland, OR	Moody Avenue Property	
DuPont, WA	Former Du Pont Explosives Plant	

Table A-9. NPL

City	Brownfield or VCP or Other Site	Adj/Proximate NPL Site (5mi rad) that may also impact sediments	NPL Site Contaminants	Status
New Bedford, MA	Sites to be determined	New Bedford Harbor (sediment)	PCBs, Cd, Pb, Cu, Cr	P
Glen Cove, NY	Captains Cove Condominiums	LiTungsten	low-level rad, U, Ra, Th, PCBs, VOCs, inorganics	P
		Mattiace Petrochemical	VOCs, TCE, ethylbenzene, xylene, PCBs	F
Charleston, SC	Sites to be determined	Koppers Co wood treatment	PAHs, pentachlorophenol, dioxin, As, Pb	P
Jacksonville, FL	Sites to be determined	Jacksonville Naval Air Station	Soil/GW: TCE, DCE, TetraCE, PCB, Cd, Cr, Pb, Cu, Hg. Sed: Pb, Cr, Cd	P
Waukegan, IL	Madison Street properties	Outboard Marine/Waukegan Harbor	Soil/GW: PCB, PAH, NH3, As, phenol. Sed: PCB	Sed: F, Soil: P
Kalamazoo, MI	Auto Ion Area, Mills Street	Auto Ion Chemicals (State owned parcel)	Soil: Cr, As, Cd, Pb, Ni, CN, PAH. Sed: Cr, Ni, CN, Cl. GW: VOCs, As, Cr, Pb, Ni	F
	Consumers Power North	Allied Paper/Portage Creek upstream pollution of Kalamazoo Riv.	Sed: PCB	P
	Riverfront BRI Site (CP South)			
St. Joseph, MI	Auto Specialties Site			
	Whirlpool Property			
	Former Superior Steel	Aircraft Components (Paw Paw Riv)	Radioactive material	P
	Malleable Site			
	CSX Railway Site			
Cedar Rapids, IA	Meat rendering and other facilities	Electro-Coatings, Inc.	GW: Hexavalent Cr, Cd, Ni, VOCs	F
Richmond, CA	Terminal I - Petromark	United Heckathorn Co.	Sed: PCB (DDT, dieldrin)	F
	Marina Bay Parcels - WWII shipyards			
	Point Molate Naval Fuel Station	Liquid Gold Oil Corp	Soil: Pb, hydrocarbons	F
San Francisco, CA	Pacific Bell Park	Hunters Point Naval Shipyard	GW/SW and Sed: Fuels, PCBs, metals, VOCs. Soil: all of previous and asbestos	P
Portland, OR	Willamette Cove Park	McCormick and Baxter Creosoting	Soil and Sed: metals, PAHs, PCP	P
	U.S. Government Moorings	Gould, Inc	GW: Pb, VOC/SVOC. Sed: VOC, Pb, As. Soil: As, Pb, Cd	P
	Triangle North Portland Yard/Riedel			
	Port of Portland Terminal 4			
	GASCO/NWNG			
	Elf Atochem			
	Portland Shipyard			
	North Marine Drive			
	Time Oil Company			
	Mobil Oil			
	Gunderson			
	Linnton Oil Fire Training Grounds			

City	Brownfield or VCP or Other Site	Adj/Proximate NPL Site (5mi rad) that may also impact sediments	NPL Site Contaminants	Status
Tacoma, WA	Thea Foss - multiple properties	Commencement Bay Near Shore - includes Thea Foss Waterway itself	PAHs, pthalate, mercury, PCB	P
		Tacoma Tar Pits	Tar-constituent contaminants	F
Bellingham, WA	Roeder Avenue Landfill	Oeser Co Wood Treatment	Soil: PCP, PAHs, carrier oil, dioxin. Traces of these found in sed, but no cleanup reqd.	P
Stockton, CA	Weber Block	Whatcom Waterway non-NPL site	Hg, 4-methylphenol, phenol	P

Appendix B. Certified, Verified, and Evaluated Site Characterization Tools

Important Definitions

verify - to establish or prove the truth of the performance of a technology under specific, predetermined criteria or protocols and adequate data quality assurance procedures.

evaluate - to carefully examine and judge the efficacy of a technology; to submit technologies for testing under conditions of observation and analysis

certify - to guarantee a technology as meeting a standard or performance criteria into the future

Source: EPA ETV Program

CalEPA Pollution Tech. Certification Program

Site Characterization Technologies	Media	Vendor	Vendor Phone
immunoassay			
BiMelyze Field Screening Assay	S	Bio Nebraska	402-470-2100
EnSys PCB RISc Soil test kit	S	Strategic Diagnostics, Newark, DE	302-456-6770
EnSys PETRO RISc Soil Test for HC	S	Strategic Diagnostics, Newark, DE	302-456-6770
EnvrioGard Petrol. Fuel in soil	S	Strategic Diagnostics, Newark, DE	302-456-6770
EnviroGard PCB	S	Strategic Diagnostics, Newark, DE	302-456-6770
EnvrioGard TNT test	S	Strategic Diagnostics, Newark, DE	302-456-6770
Ohmicron PAH RaPID ASSAY	S, W	Strategic Diagnostics, Newark, DE	302-456-6770
Ohmicron PCB RaPID ASSAY for PCB	S, W	Strategic Diagnostics, Newark, DE	302-456-6770
Ohmicron PCB RaPID ASSAY for PCP	S, W	Strategic Diagnostics, Newark, DE	302-456-6770
Ohmicron Total BTEX RaPID ASSAY	S, W	Strategic Diagnostics, Newark, DE	302-456-6770
Ohmicron TNT RaPID ASSAY	S, W	Strategic Diagnostics, Newark, DE	302-456-6770
SDI PCB DTECH	S	Strategic Diagnostics, Newark, DE	302-456-6770
SDI DTECH BTEX	S, W	Strategic Diagnostics, Newark, DE	302-456-6770
SDI DTECH TNT	S, W	Strategic Diagnostics, Newark, DE	302-456-6770
SDI DTECH RDX (cyclotrimethylenerinitramine)	S, W	Strategic Diagnostics, Newark, DE	302-456-6770

cone penetrometer with laser induced flourometry

Navy Cone Penetrometer (SCAPS-LIF) for TPH, PAH	S	Navy NraD/SPAWAR, San Diego, CA	619-553-1172

EPA Environmental Technology Verification (ETV)

Note, verification differs from certification - read reports

Site Characterization Technologies	Media	Vendor	Vendor Phone
cone penetrometer with laser induced flourometry			
Rapid Optical Screening Tool for TPH, PAH	S	Fugro Geosciences, Houston, TX	713-778-5580
Navy Cone Penetrometer (SCAPS-LIF) for TPH, PAH	S	Navy NraD/SPAWAR, San Diego, CA	619-553-1172
field analytical tools for PCBs			
L2000 PCB/Chloride Analyzer	S, DF, Wp	Dexsil Corporation, Hamden, CT	203-288-3509
EST 4100 Vapor Detector	S, Wp	Electric Sensor Technology	805-480-1494
Envirologix - PCB in Soil Tube Assay	S	Envirologix, Portland, ME	207-797-0300
PCB Immunoassay Kit	S	Hach Company, Loveland, CO	800-227-4224
SDI PCB DTECH	S	Strategic Diagnostics, Newark, DE	302-456-6770
EnviroGard PCB	S	Strategic Diagnostics, Newark, DE	302-456-6770
SDI RaPID ASSAY for PCB Analysis	S, W	Strategic Diagnostics, Newark, DE	302-456-6770
portable GC/MS			
EM-640	W, S, SG	Bruker-Daltonik Products, Germany	49 (421) 22 05-200
SpectraTrak 672	W, S, SG	Bruker-Daltonics, Billerca, MA	978-667-9580
soil/soil gas sampling techniques			
AMS Dual Tube Liner Sampler	S	Art's Manuf. and Supply, Sauk City, WI	800-635-7330
JMC Environmentalist's Soil Probe	S	Clements and Assoc., Newton, IA	515-792-8285
Large Bore Soil Sampler (Geoprobe)	S	Geoprobe Systems, Salina, KS	800-GEOPROBE
Emflux Soil Gas Investigation System	S	Beacon Env. Services, Forest Hill, MD	410-838-8780
Core Barrel Sampler	S	SimulProbe Technologies, Novato, CA	call NERL
Gore-Sorber Screening Survey Passive SGS System	S	W.L. Gore and Associates	888-914-4673
well-head monitoring for VOCs			
EST 4100 Vapor Detector	W	Electric Sensor Technology	805-480-1494
HAPSITE	W	Inficon Inc., East Syracuse, NY	315-434-1100

Type 1312 Multi-gas Monitor	W	Calif. Analytical Inst./Innova, Orange, CA	714-974-5560
Voyager	W	Perkin-Elmer, Norwalk, CT	800-762-4000
Scentograph Plus II	W	Sentex Systems, Fairfield, NJ	800-736-8394

Superfund Innovative Technology Evaluation (SITE)

Note: evaluation differs from certification - read reports

Site Characterization Technologies	Media	Vendor	Vendor Phone
sediment sampling devices			
Split Core Sampler for Submerged Sediments	AS	Art's Manuf. and Supply, Sauk City, WI	800-635-7330
Russian Peat Borer	AS	Aquatic Rsrch Instruments, Lemhi, ID	800-320-9482
field portable x-ray fluorescence			
SEFA-P Analyzer (now the XP1000)	S	HNU Systems, Newton, MA	617-964-6690
X-MET 920-P	S	Metroex, Ewing, NJ	609-406-9000
X-MET 920-MP	S	Metroex, Ewing, NJ	609-406-9000
XL Spectrum Analyzer (300 Series)	S	Niton Corporation, Bedford, MA	800-875-1578
MAP Spectrum Analyzer	S	C-Thru Technologies, Kennewick, WA	800-466-5323
TN 9000	S	TN Spectrace, Sunnyvale, CA	408-744-1414
TN Pb Analyzer	S	TN Spectrace, Sunnyvale, CA	408-744-1414
immunoassay			
BiMelyze Field Screening Assay	S	Bio Nebraska	402-470-2100
Test Kit for Anodic Stripping Voltammetry for Mercury	S	Radiometer	call NERL
soil and soil gas sampler			
JMC Environmentalist's Soil Probe	S	Clements and Assoc., Newton, IA	515-792-8285
pre-1995 SITE tests (some tools have been updated) cone penetrometer with laser induced flourometry			
Rapid Optical Screening Tool for TPH, PAH	S	Fugro Geosciences, Houston, TX	713-778-5580
Navy Cone Penetrometer (SCAPS-LIF) for TPH, PAH	S	Navy NraD/SPAWAR, San Diego, CA	619-553-1172
portable GC/MS			
Precursor of EM-640*	S, W, SG	Bruker-Daltonik Products, Germany	49 (421) 22 05-200
FASP Method for PCB	S, W	U.S. EPA, OSWER-OERR	703-603-8831
FASP Method for PCP	S, W	U.S. EPA, OSWER-OERR	703-603-8831
spectrometers			
Long Path Fourier Transform Infared Spectrometer*	S	MDA Scientific	call NERL
Canister-based Sector Sampler	SG	Xontech, Van Nuys, CA	818-787-2593

immunoassay

L2000 PCB/Chloride Analyzer	S, DF, Wp	Dexsil Corporation, Hamden, CT	203-288-3509
Clor-N-Soil PCB Test Kit	S	Dexsil Corporation, Hamden, CT	203-288-3509
EnviroGard PCB	S	Strategic Diagnostics, Newark, DE	302-456-6770
Ohmicron PCB RaPID ASSAY for PCP	S, W	Strategic Diagnostics, Newark, DE	302-456-6770
EnviroGard PCP	S, W	Strategic Diagnostics, Newark, DE	302-456-6770
EnSys PCP RISc Soil test kit	S, W	Strategic Diagnostics, Newark, DE	302-456-6770
PCP Test Kit	S	HNU Systems, Newton, MA	617-964-6690
PCP Test Kit*	S	Westinghouse Gov't Env Services	call NERL

Env. Security Technology Certification Program

Department of Defense

Note: ETSCP does not confer a "certification". Results determine DoD application & commercialization prospects for the tool.

Verified Site Characterization Technologies	Media	Vendor	Vendor Phone
Navy Cone Penetrometer (SCAPS-LIF) for TPH, PAH	S, W	Navy NraD/SPAWAR, San Diego, CA	619-553-2778

ESTCP Projects in Progress	Media	Contact and affiliation	Contact Phone
Rapid Sediment Characterization	AS	Dr. James Leather, USN	619-553-6240
Quantifying In Situ Contaminant Mobility in MarineSed	AS	Mr. Tom Hampton, USN	619-553-1172
SCAPS Heavy Metal Sensors	S	Dr. Stephen Lieberman, USN	619-553-2778
Tri-Service SCAPS Demonstration/Validation	S, W	Mr. George Robitaille, USA	410-612-6865
In Situ Radiation Detection	S	Mr. Chris Dewitt, USAF	505-846-0053
High Resolution Seismic Reflection (for DNAPLs)	Subsurf.	Mr. Nate Sinclair, USN	805-982-1005
TNT and RDX-detecting immunosensors	S	Ms. Anne Kusterbeck, USN	202-404-6042
Electromagnetic Surveys for 3D Imaging of Contam.	Subsurf.	Mr. Nate Sinclair, USN	805-982-1005

Rapid Commercialization Initiative

Federal Multi-Agency Cooperation

Verified Site Characterization Technologies	Media	Vendor	Vendor Phone
Multisampling Suction Lysimeter	S, W	Bladon International	Oak Brook, IL
Portable Spectrometer for use with test kits	S, W	Hanby Environmental Lab, Inc	281-391-4257

Useful phone numbers

NERL - Research Triangle Park, NC: (919) 541-2106
NERL - Las Vegas: (702) 798-2525
NERL - Cincinnati: (513) 569-7577
NRMRL - Washington, DC: (202) 564-3212

Key

Media
S-soil
W-water (incl groundwater)
G-soil gas (air)
AS-aquatic sediment
DF-dielectric fluids
Wp- surface wipes

*=report out of stock–"Media" represents only tested media