

Opportunities For Petroleum Brownfields



Foreword

The U.S. Environmental Protection Agency (EPA) Office of Underground Storage Tanks (OUST), in partnership with the EPA Office of Brownfields and Land Revitalization (OBLR), released the Petroleum Brownfields Action Plan: Promoting Revitalization And Sustainability (Action Plan) in October 2008 (www.epa.gov/oust/pubs/pebrofactionplan.htm). Its purpose was to improve stakeholder communications; expand technical assistance to states, tribes, and local governments; explore potential policy changes; and build upon existing successes by expanding partnerships to clean up and reuse petroleum-contaminated properties.

Since the release of the Action Plan, EPA focused on providing tools to assist stakeholders to better understand the options and diversity of petroleum brownfields as well as the latent opportunities these properties often represent. EPA expanded and updated the EPA OUST website (www.epa.gov/oust/petroleumbrownfields) to provide more information, including case studies of successful reuse projects for stakeholders to use as models. EPA also developed two reports to help broaden the discussion on petroleum brownfields: *Petroleum Brownfields: Developing Inventories* (www.epa.gov/oust/pubs/pbfdevelopinventories.htm) and *Petroleum Brownfields: Selecting A Reuse Option* (www.epa.gov/oust/pubs/pbfreuseoption.htm).

With *Opportunities For Petroleum Brownfields*, EPA has developed a tool to help state, tribal, and local public officials, communities, developers, nonprofit organizations, and other stakeholders identify and tap into the potential of these sites and reap the associated environmental, economic, and aesthetic rewards of their revitalization. This report presents five categories of petroleum brownfields, examples of successful reuse projects within those categories, and funding and technical assistance resources for petroleum brownfields revitalization. By analyzing above and underground storage tank data; compiling funding and technical assistance resources from the federal, state, local, and private sectors; and relating successful approaches to revitalization from multiple redevelopment projects, this report aims to give stakeholders the information they need to assess, clean up, and safely reuse petroleum sites in ways that can benefit communities.

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I: Introduction

O*pportunities For Petroleum Brownfields* helps stakeholders faced with brownfields that have known or suspected petroleum contamination issues learn more about these types of properties, the opportunities and challenges they present, and the ways these sites can be successfully addressed and reused. The purpose of defining and categorizing the universe of petroleum brownfields is to help identify information common to petroleum-contaminated properties and support petroleum brownfields stakeholders as they navigate the process of identification, assessment, cleanup, and revitalization of these sites. Examples of stakeholders who can benefit from this report include communities, nonprofit organizations, state and local governments, tribes, property owners and prospective purchasers, and developers and lenders. The report helps define the types of sites likely to be considered “petroleum brownfields” and offers links to stakeholder resources and technical assistance opportunities. More specifically, this report:

- Provides a detailed description of the universe of petroleum brownfields;
- Describes and defines five categories into which petroleum brownfields can fall and the methodology used for these categorizations;
- Provides background information and relevant reuse examples across these five categories; and
- Includes comprehensive case studies for three successful petroleum brownfields reuse projects.

In a final section, the report’s list of petroleum brownfields resources includes federal and state funding and technical assistance opportunities, as well as a number of local, private-sector, and other resources available to stakeholders. While the list of tools and resources in this document is not intended to be comprehensive, the resources provided will be of value to those looking to assess, clean up, and safely reuse petroleum brownfields. Like all brownfields, petroleum-affected properties are often loaded with reuse potential and can become future sites for commerce, industry, recreation, restored natural habitat, and other beneficial uses for communities. This report can help stakeholders turn these types of reuse plans into reality.

EPA – Partners and Opportunities for Cleanup and Revitalization

The U.S. Environmental Protection Agency’s (EPA) Office of Underground Storage Tanks (OUST) and the EPA Office of Brownfields and Land Revitalization (OBLR or Brownfields Program) manage EPA program efforts that focus on the cleanup and revitalization of petroleum brownfield sites. OBLR takes the lead in overseeing the award and management of Brownfields grants for the assessment and cleanup of petroleum brownfields, while OUST, in conjunction with state programs and the ten EPA Regional offices, implements a regulatory program for underground storage tank (UST) systems—which are often associated with petroleum-affected properties. It should be noted that the types of properties eligible for EPA Brownfields petroleum assessment and cleanup grants represent only a subset of the overall “universe” of sites with potential petroleum contamination issues (this is defined more clearly in the next section of this report). To address the larger universe of petroleum brownfields, OUST offers tools and resources to help with petroleum site identification, assessment, cleanup, and reuse.

OUST works closely with the states and tribes on the implementation of the UST and leaking underground storage tank (LUST) programs. In addition to its collaborations with OBLR and state and tribal programs, OUST partners with other EPA offices, including the Office of Sustainable Communities (OSC) and the Office of Emergency Management (OEM). OSC and OUST work together to provide technical assistance to communities to help them address challenging sites, such as petroleum brownfields, and incorporate smart growth strategies into their planning efforts for redevelopment. OUST confers with OEM on the regulation of non-transportation-related facilities storing, producing, using, processing, refining, or otherwise managing oil of any kind that could potentially release oil into navigable waters. EPA requires such facilities to develop

and implement Spill Prevention, Control, and Countermeasure (SPCC) plans. Once a facility is closed, SPCC requirements are no longer implemented. This can lead to the abandonment of a facility with oil tanks, thus becoming a potential cause of petroleum brownfields. OUST also continues to support individual state UST programs in addressing petroleum brownfields.

Description of Report Content

As every petroleum brownfields reuse scenario is unique, this report will be of different value to each person using it. The report illustrates the diversity of petroleum brownfields and describes categories of such properties as well as reuse project examples from each of the five categories of sites (Section II). Full case studies are provided for three different petroleum brownfields reuse projects; these offer information on obstacles overcome and lessons learned (Section III). For those with funding gaps in their revitalization projects, the report provides a list of potential funding sources across federal, state, and local programs (Section IV). This section also lists technical assistance opportunities for environmental assessments, site reuse planning, or community involvement strategies. The Appendix contains a list of state and territorial brownfields, UST/LUST, and UST fund program websites. The report is designed to provide enough background information to give stakeholders an understanding of the different types of petroleum brownfields and the number and types of resources available to help address these sites.

II: Defining Petroleum Brownfields and Their Universe

Petroleum brownfields can be a complicated concept. Given two adjacent brownfields, the approach to reuse at each site could be very different. Federally-regulated USTs¹ are typically managed by state programs. These sites are often ineligible for EPA Brownfields funding because they do not meet EPA's funding criteria. Nonregulated sites with no viable responsible party are more likely to meet EPA eligibility requirements for Brownfields funding. The distinction is important in order to classify a petroleum brownfield site and determine appropriate and eligible funding and technical assistance. EPA considers a petroleum brownfield to be a site contaminated with petroleum that qualifies for EPA Brownfields funding while other entities, such as states, may use different criteria to define petroleum brownfields. The petroleum brownfields universe, as defined in this report, is not necessarily limited to the types of properties eligible for EPA Brownfields grants; rather it encompasses all brownfields potentially contaminated by petroleum.

As mentioned, states are an important partner in petroleum brownfields cleanup and reuse and will be able to help characterize sites according to the EPA Brownfields eligibility criteria identified below. Stakeholders should refer to EPA Brownfields grant eligibility guidelines to determine whether a given site meets the eligibility criteria before applying for funding or technical assistance. State UST programs can help stakeholders identify if a site falls under the purview of its regulatory program and provide guidance on how to pursue potential assistance. State UST and brownfields programs' websites are a great resource for stakeholders as the websites often have answers readily available to common questions regarding eligibility and other petroleum brownfields-related questions. It should be noted that each state operates differently and may have unique criteria for defining petroleum brownfields. In New Hampshire, for instance, the mere presence or even potential presence of petroleum can likely qualify a site as a petroleum brownfield. Oklahoma addresses oilfields as part of its petroleum brownfields universe when in fact the prominent contaminant is not petroleum. Therefore, oilfields are not considered petroleum brownfields by the federal program, but other federal brownfields funding can be used to address the assessment and cleanup of oilfields. In Colorado, two separate and distinct agencies—the Division of Oil and Public Safety and the Department of Public Health and Environment—are working together to define site eligibility requirements to help streamline the petroleum brownfields determination process.

EPA Brownfields Definition

EPA defines a brownfield as a “real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.” In January 2002, the Small Business Liability Relief and Brownfields Revitalization Act was signed into law. This law expanded the original EPA Brownfields Program by including relatively low-risk petroleum sites as eligible sites for Brownfields Assessment and Cleanup grant funding. EPA's detailed criteria for determining whether a site is considered a brownfield can be found at www.epa.gov/brownfields/overview/glossary.htm.

For a petroleum-contaminated site to be eligible for Brownfields grant funds, EPA or a state must determine that:

- The site is of relatively low-risk compared with other exclusively petroleum-contaminated sites in the state;
- The site has no viable responsible party;

¹Not all USTs are federally regulated. Please visit <http://www.epa.gov/oust/faqs/ustdefn.htm> for more information on UST systems and how they are regulated.

- The funding will be used by a party that is not potentially liable for the petroleum contamination to assess, investigate, or clean up the site;
- The site is not subject to a corrective action order under the Resource Conservation and Recovery Act (RCRA);
- The site does not include facilities receiving funds for cleanup from the LUST Trust Fund; and
- The site is not: 1) undergoing or have a planned removal action under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA); 2) proposed for or listed on the National Priorities List; and 3) subject to an order or consent decree entered into by the parties under Superfund or other federal programs.

Please note that the above criteria are from EPA’s most recent eligibility guidelines for petroleum brownfields; any potential applicant for an EPA Brownfields grant should refer to the most recent version of those guidelines (available at: <http://www.epa.gov/brownfields/applicat.htm>) before applying.

Defining the Petroleum Brownfields Universe

For development of this publication, EPA analyzed sites tracked in its Assessment, Cleanup, and Redevelopment Exchange System (ACRES) database; state tank incident databases; and a number of secondary resources for information on petroleum brownfields, including interviews with local, state, and federal program contacts. The goal of the research was to identify the types of sites commonly thought of as petroleum brownfields and those that could be considered potential petroleum brownfields. Sites were identified and categorized through a mix of research methods. The purpose of defining the petroleum brownfields universe is to help identify information common to petroleum-contaminated properties and support petroleum brownfields stakeholders as they navigate the process of identification, assessment, cleanup, and revitalization of these sites.

Based on the review of available information and discussions with petroleum brownfields stakeholders, the set of categories that emerged is based on general land use designations and former use trends. The categories presented in this report are: commercial, industrial, transportation, residential, and open land. These categories encompass the range of sites that historically have been petroleum brownfields and the types that could be considered petroleum brownfields. They take into account current and former land use designations. Generally, stakeholder interviews and data suggest that USTs are the most common release source for a site’s petroleum contamination. In addition, a petroleum brownfield designation may include large sites where only a fraction of land is potentially affected by petroleum contamination (e.g., a small parcel with a leaking

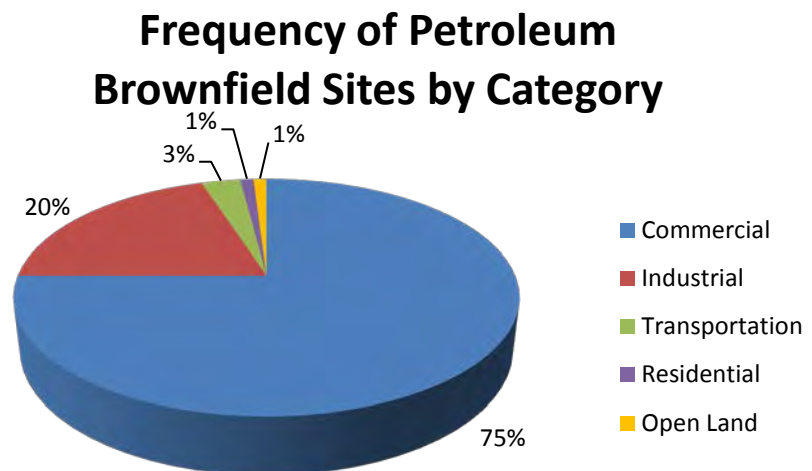


Figure 1 – Frequency of petroleum brownfields sites by category²

² Estimates based on sites observed in ACRES and secondary research materials contributed to the development of the categories. Data as of March 2011. *Note:* The ACRES database likely underrepresents certain categories of petroleum brownfields sites, such as residential, due to difficulties in identifying or inventorying these types of properties.

petroleum storage tank encompassed by a much larger commercial property). Figure 1 illustrates the frequency of petroleum brownfields sites by category. The chart is a result of a qualitative analysis of ACRES and secondary data (e.g., previous publications, stakeholder interviews). Text fields in ACRES were analyzed by predominant past use for former use information, which varies in availability and detail as voluntarily reported by Brownfields grant recipients. State tank data and the secondary resources generally supported the results of the qualitative ACRES analysis.

It should be noted that depending on the particular geographic region, the types of petroleum brownfields may vary, and USTs may not be the most common source of potential petroleum contamination. For example, in Oklahoma and Texas there are a significant number of oilfields as a result of former oil exploration and drilling activities. These two states have over 400,000 known producing and temporarily shut-in wells. In addition, Oklahoma and Texas have more than 800,000 historically drilled and abandoned oil, natural gas, and exploratory wells. Oklahoma has found approximately 11,000 abandoned oilfield sites in the last 15 years, which is over twice the number of UST cleanup sites it found during the same time period.³

The significance that the examples within this section illustrate is that given the wide range of former uses for petroleum brownfields, there is an equally wide range of potential reuses. If cleanup standards are achieved, petroleum brownfields can offer stakeholders redevelopment opportunities that are protective of human health and the environment and that help achieve community redevelopment goals. A dumping field for oil industry waste can become the site for a new wing of a hospital. A former petroleum product distribution facility that contaminated surrounding land can be redeveloped safely into residential units. The ways in which petroleum brownfields can be transformed into assets are as diverse as their original uses.

Categories of Petroleum Brownfields

Commercial — The majority of the petroleum brownfields sites fall into this category. The category includes all sites related to automobile purchasing, repair, and fueling (e.g., gasoline stations) and all other general commercial facilities. Certain public uses, such as school, public works, police, or military facilities, and sites used to support commercial agriculture are also included in this category.

Industrial — The second most common type of site observed in the data are industrial sites. This category represents sites used for all forms of manufacturing and heavy industrial purposes, including bulk oil storage (e.g., oil tank farms), pipeline compressor stations and storage yards, former refineries and natural gas treatment plants, power generation facilities, and mining-related sites. Light-to-heavy manufacturing sites are most common within this category.

Transportation — Sites with a transportation-related use are observed in the data regularly, warranting this category for sites that support the movement of goods and services. Sites in this category include rail yards, railroad spurs, roundhouses, airport facilities, and distribution centers for oil and coal, as well as former oil pipelines.

Residential — Residential sites are less common than the categories described above. These sites include those used for housing, those located in residential areas, vacant sites where historical documentation reveals a residential past use, housing on a military or industrial site, or an apartment building or home with a heating oil tank.

Open Land — This type of site is not frequently observed in the data analyzed but still warrants a separate category. Sites in this category typically are undeveloped parcels of land that have been environmentally compromised. This may be the result of illegal dumping or storage, the presence of an above ground storage

³ Information provided by Patricia Billingsley of the Oklahoma Corporation Commission.

tank, or proximity to another site with contamination issues. Oilfields resulting from oil exploration and drilling activities also fall under this category because the footprint associated with these activities is relatively small in comparison to the amount of open land surrounding the impacted areas.

These categories are identified to help stakeholders understand the land uses that could account for petroleum contamination. As always, it is important to recognize that not all brownfields require cleanup if an assessment determines that contamination is not present at the property. If contamination is found at the property, it might not be limited to petroleum. For example, a petroleum brownfield site⁴ may have a number of commingled contaminants of which petroleum is only one. Also, these sites may be viewed by the public as a petroleum brownfield regardless of whether they are regulated or nonregulated. In the next section, the listed land use categories identify type of site use, potential contamination, site size, media affected, and possible institutional controls⁵. Stakeholders are encouraged to use this information to help get revitalization projects started but also to review state brownfields, UST/LUST, and UST fund program websites for readily available information and to get in touch with their appropriate state contact(s) when additional assistance is needed. A list of state and territorial brownfields, UST/LUST, and UST fund program websites can be found in the Appendix of this report.

⁴ EPA considers a petroleum brownfield to be a site that qualifies for EPA petroleum Brownfields funding while other entities, such as states, may use different criteria to define petroleum brownfields.

⁵ Institutional controls are defined broadly as legal measures that limit human exposure by restricting activity, use, and access to properties with residual contamination.

Category I – Commercial

Definition

Properties with former uses related to the retail or wholesale of products and services, as well as those that served a specific institutional, public, or civic need.

Background Information

The commercial category represents the most diverse and largest number of sites as a result of the volume of former automotive service- and sales-related sites in the U.S., as well as the wide variety of sites with former commercial uses. Gasoline stations are the most common former use in this category. Other common prior uses are automotive-related (e.g., auto repair, parking lots, garages, dealerships) or mixed (e.g., banks, auto parts distributors, tire and battery outlets, grocery stores, offices, restaurants). Marinas, including boat and equipment storage and repair, where spills or leaks from old fuel and/or oil storage tanks may cause petroleum contamination also fall under this category. While there are certain shared characteristics of this category with both the transportation and industrial categories, what sets this category apart is its focus on the sale of goods and services to the end user versus the production or movement of goods and services. Sites in this category are commonly related to automotive service or sales, including automotive-related sites such as towing services, raceways, and charter bus companies; those used for a variety of public uses such as school, public works, police, or military facilities; and sites used to support commercial agriculture. Research indicates that floor drains in service station/auto shops are a common source of contamination as oil and other products leak to the ground and are washed outside to affect soil and groundwater.



Abandoned gasoline stations

Sites in this category vary in size from .01 acre to 57 acres.⁶ However, the majority were less than three acres; these sites tend to be associated with gasoline stations, garages, vacant lots, or general commercial retail located close to an automotive service-related site. Sites larger than three acres tend to be associated with automotive dealerships and other larger retailers; salvage or junkyards; combined parcels with one

⁶ Property sizes for all site categories are based on sites analyzed in the ACRES database and are not necessarily reflective of all petroleum brownfields sites. A petroleum brownfield designation may include large sites where only a fraction of land is potentially affected by petroleum contamination, or, conversely, a small site that is only one parcel of a larger property that has been assessed.

having an automotive-related former use; or sites associated with a public or institutional former use such as schools, hospitals, or the military. Common contaminants found at these sites include petroleum contamination, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), lead, and other metals. Soil and groundwater are the most common media affected at these sites. If institutional controls (ICs) are required on these sites, the most common IC category issued is informational devices (e.g., state registries, deed notices, advisories), followed by governmental controls (e.g., zoning, building codes, drilling permit requirements) and proprietary controls (e.g., easements, covenants).

Reuse Project Examples

There are multiple examples of reuse projects at commercial sites, especially former gasoline stations. One such project is in **Throckmorton, Texas**, in a historic county that is a geographical, historical, and political gateway to west Texas. The former Throckmorton Service Station was situated at the artery of three major interstates and adjacent to the historic courthouse in downtown Throckmorton. The station opened in 1957 on .05 acres of land and served the small rural town until 2007, when one of the site's four USTs was punctured during municipal utility construction. The project received \$71,000 from EPA Region 6's Targeted Brownfields Assessment (TBA) Program and \$32,200 from an EPA Brownfields Cleanup grant, allowing for site assessments and the removal of 10 cubic yards of petroleum-contaminated soil, 550 gallons of oil-tainted water, and all four USTs. Today, the site is home to a small public park memorializing the town as the gateway to west Texas.

In downtown **Boise, Idaho**, a .45-acre site had been used for automotive service starting in 1947. When the site's use changed to a 223-space parking garage in 1963, two USTs remained on the property. City engineers deemed the parking garage structurally unsound in 2000. The garage was owned at the time by the Capital City Development Corporation, an urban renewal agency that applied for and received a petroleum Brownfields Assessment grant from EPA in 2004. That grant funded the creation of a brownfields inventory for Boise's entire downtown district and eventually led to the full cleanup of the site, including removal of the two long-buried USTs. The property was eventually redeveloped as the Banner Bank Building, an environmentally-friendly, energy-efficient 195,000-square-foot office building. Completed in 2006, the Banner Bank Building received a U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) Platinum certification as well as a 2008 Phoenix Award for "exemplary brownfield redevelopment and revitalization."

Though not often recognized as a "traditional" petroleum brownfield, sites used for public uses can also have petroleum contamination, such as the former Catholic school site located within the **Gila River Indian Community (GRIC)**. The fourth highest populated Indian Reservation in the U.S., the GRIC is located just south of Phoenix, Arizona. St. John's Mission occupied 160 acres within the reservation as a Catholic school from the 1920s to the late 1990s, providing support and education to a community with high unemployment and diabetes rates. Over decades of use, USTs for fueling the school's buses were suspected of contaminating portions of the site's soil and groundwater. GRIC received nearly \$75,000 in funding from EPA's Office of Underground Storage Tanks in 2002 and a \$200,000 EPA petroleum Brownfields Cleanup grant in 2004 to address contaminated areas on a 40-acre portion of the site, which resulted in the removal of two USTs. The project received an additional \$6 million in federal funding that enabled the transformation of the property into a Diabetes Resource Center, a Boys and Girls Club, and a 10-acre community park.



Boys & Girls Club redeveloped on the site of the mission's former gymnasium

The Pik Kwick gasoline station operated in the Harris Park Historic Area of *Westminster, Colorado*, from 1952 until 1992 when the USTs were removed and contamination was discovered. The .5-acre property remained vacant from 1992 until redevelopment was stimulated in 2007 once eligibility to the state fund was established and cleanup began. The Colorado Division of Oil and Public Safety's (OPS) Petroleum Storage Tank Committee determined the immediately previous owner was not responsible for the release. Based on this status, the current owner chose to have the state conduct the cleanup, which includes soil vapor extraction with oxygen diffusion at a cost of approximately \$526,000. OPS worked closely with the developer, city, and the purchaser of the completed building to integrate site cleanup with the property's end reuse.

Completed in 2008, the 12,000-square-foot Neighborhood Building contains retail and office space. Due to redevelopment, approximately 24 full-time office positions and 10 full-time retail positions were created as well as approximately \$33,000 in city and county tax revenues.

Category II – Industrial

Definition

Sites formerly used for predominantly light-to-heavy manufacturing operations.

Background Information

The industrial category is second only to the commercial category in the number of sites identified. This category is diverse and includes former land uses that range from oil refineries to steel and iron manufacturing to food production. The industrial category also has strong ties to land utilized for industry that is often located near major infrastructure used to transport goods to the market place (e.g., waterfront ports, rail, airports, and highways). What sets the industrial category apart from the transportation and commercial categories is its focus on the production of goods rather than their movement or sale.

Other former land uses frequently observed in the industrial category include those for the reconditioning, manufacture, and storage of heavy machinery; bulk fuel storage; a parcel on an industrial site used to store fuel (e.g., coal, oil); steel manufacturing; and warehouses. However, this category also includes former uses such as metal scrap yards, automotive manufacturing and crushing facilities, asphalt plants, electric power generation, and natural resource mining and exploration operations.



Former bulk oil storage terminal (left) and abandoned manufacturing site (right)

Sites reviewed varied in size from .01 acre to 693 acres; however, the majority of sites were less than five acres. Smaller sites were associated with a wide range of industrial facilities, such as land used for bulk fuel storage, reconditioning of large machinery, metal fabrication, mills and foundries, and a host of other general manufacturing uses. Sites larger than seven acres were typically associated with mixed industrial uses, manufacturing of large equipment, steel and iron manufacturing, and refineries. Though less frequently observed, larger sites were also associated with quarries and mining and oil exploration and drilling. Assessments of industrial properties often revealed petroleum, VOCs, PAHs, lead, and other metals. Soil and groundwater are the most common media affected. When ICs are required, proprietary controls (e.g., easements, covenants), governmental controls (e.g., zoning, building codes, drilling permit requirements), informational devices (e.g., state registries, deed notices, advisories), and enforcement/permit tools (e.g., orders, permits, consent decrees) were observed. In many regards, commercial sites and industrial sites are very similar in contamination, media affected, and ICs required.

Reuse Project Examples

One successful reuse project is the Clyde Iron Works project in **Duluth, Minnesota**. Products manufactured at this 12.2-acre steel foundry and manufacturing company established in 1889 were used to support the logging industry and for constructing bridges, dams, and tunnels across the nation. In 2003 a reuse project for the Clyde Iron Works facility began, with the goal of a mixed-use redevelopment that would help revitalize the surrounding community. In 2005, the City of Duluth received a total of \$400,000 in EPA Brownfields Assessment grants for petroleum and hazardous substances, which allowed for formation of a cleanup strategy. In 2010, after seven years of cleanup and reconstruction, the Clyde Iron Works site was transformed into the Clyde Park marketplace. This development includes the Clyde Restaurant & Bar, Brewery, and Event Center. During this project, developers focused on preserving the history of the site by restoring much of the historical architecture, including the massive iron beams and timber columns, along with the facility's original brick and wood flooring. In addition, a portion of the site was donated to the nonprofit Duluth Heritage Sports Center, which constructed a new 1,200-seat hockey arena, a multi-use sports pavilion, a 12,000-square-foot Boys and Girls Club, recreational space, and an arts and crafts center.

As one of the fastest growing colleges in the state, Goodwin College, located in **East Hartford, Connecticut**, wanted to expand. The College purchased adjacent properties totaling 30 acres along Riverside Drive, which had been used for petroleum storage and distribution due to their proximity to the Connecticut River. These properties were substantially contaminated with petroleum, VOCs, PAHs, and lead. The Metro Hartford Brownfields Assessment Program, a joint project of the Capitol Region Council of Governments and the MetroHartford Alliance, worked together with the Connecticut Department of Environmental Quality, Goodwin College, the Town of East Hartford, and the Connecticut Development Authority to remove 30 above ground storage tanks (ASTs) and address contaminated soil using natural bioremediation techniques. A \$121,900 Brownfields Assessment grant was provided by EPA; cleanup and development is being funded by Goodwin College (which has contributed approximately \$52 million) and the Connecticut Development Authority (which provided \$3 million). Total costs for cleanup and redevelopment are estimated at \$115 million.



Goodwin College has also assembled more than 700 acres along Riverside Drive surrounding its newly improved campus to create a publicly-accessible riverfront park that includes 2½ miles of walking trails and several sports fields. Construction of its new riverfront campus is slated for completion in 2012 and will include 257,500 square feet of new classrooms, dorms, a library, an early childhood learning center, and administrative space. The first building to have been completed as part of this project houses 39 new classrooms, six science labs, computer labs, a student lounge, a café, a 700-seat auditorium, a library and media center, and community rooms.

Oklahoma City, Oklahoma, went through boom and bust periods until the oil industry collapsed in the 1980s. To attract new investors and employers downtown to revitalize its stagnant economy, the city devised a unique and innovative approach known as the Metropolitan Area Projects (MAPS) plan, which proposed a one-cent increase in the city's sales tax for public infrastructure projects. The plan was voted on by the public in December 1993, and with public support for new infrastructure and diversified commercial growth, the MAPS initiative soared. The resulting \$309 million in funds and \$54 million in tax revenue interest went directly to rebuilding and renovating downtown infrastructure; remediating petroleum brownfields, industrial sites, and oilfields; and turning the area into a vibrant commercial and community center.

In total, there were nine public infrastructure projects under the MAPS initiative, including the Bricktown Ballpark, the Ford Center, the downtown library, the Bricktown Canal restaurant and shopping district, renovation of the Myriad Convention Center, improvements to the state fairgrounds, rebuilding of the Civic Center Music Hall, the restoration and redevelopment of a seven-mile stretch of the North Canadian River now known as the Oklahoma River, and the introduction of the "Oklahoma Spirit" trolley system. The final project, the downtown library, was dedicated in August of 2004. Overall, private and public capital investments, including MAPS, exceeded \$4 billion. A new MAPS initiative is now acquiring land between downtown Oklahoma City and the banks of the Oklahoma River for the development of a 750-acre Core to Shore park and residential/retail area project located in an old oilfield, light industrial, and partly residential area. Thus far, over 50 potential petroleum brownfields have been located for assessment.⁷



*Bricktown Canal area before MAPS
(Source: City of Oklahoma City)*



*Bricktown Canal area after MAPS
(Source: City of Oklahoma City)*

⁷ Information about the MAPS project was provided by Lloyd A. Kirk, Environmental Programs Specialist with the Oklahoma Department of Environmental Quality. For more information on the MAPS project, visit: http://www.brownfieldrenewal.com/print-features_perspective_transformation_of_a_city_mdash_one_penny_at_a_time-856.html.

Category III – Transportation

Definition

Sites in the transportation category predominantly had a former use related to supporting the movement of goods and services in both the public and private sectors.

Background Information

Transportation-related land use is where the land is used for goods and services in transit and for maintenance of the rail cars, boats, and planes used to transport goods and services. Most of the sites in this category are related to the rail industry (e.g., switchyards, freight depots, rail car storage and maintenance, and railroad spurs) but also include airport grounds, fleet service and maintenance such as those related to the trucking industry, and distribution centers for oil and coal. Pumping and/or compressor stations for oil and natural gas pipelines and pipeline leak areas would also be included.

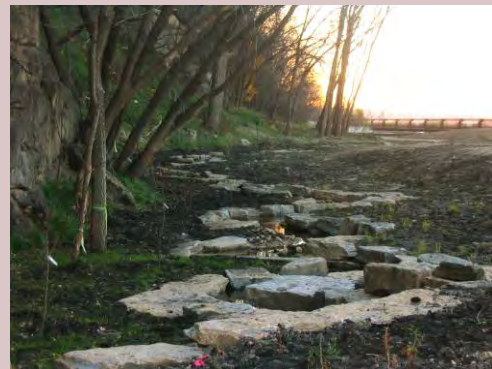


Abandoned rail yards

Site acreage reviewed included sites from .01 acre to 144 acres; however, the majority of sites were less than ten acres. Petroleum contamination is common at these sites, as are PAHs, VOCs, lead, and other metals. Soil and groundwater are the most common media affected. When ICs are required, they are governmental controls (e.g., zoning, building codes, drilling permit requirements) and informational devices (e.g., state registries, deed notices, advisories).

Reuse Project Examples

There are many different examples of current reuse projects at sites that fit within this category: an airport in Ohio, an airport hangar in Illinois, a rail yard in Missouri, a fleet fueling and maintenance site in Michigan, and a former rail yard in *St. Paul, Minnesota*. In St. Paul, the city identified a 27-acre former rail yard along the Mississippi River that was covered in trash, abandoned appliances, and contaminated soil. The city used a total of \$400,000 in EPA Brownfields Cleanup grants to prepare the site for reuse; the project also leveraged funding from the National Park Service, the Minnesota Department of Natural Resources, and the Trust



Bruce Vento Nature Sanctuary in St. Paul, MN

for Public Land to acquire and convey the land to the City of St. Paul. Completed in 2004, cleanup included the removal of 7,500 tons of petroleum-contaminated soil, redistribution of 20,000 tons of soil, and replacement of another 25,000 tons of soil to safely cover the property. After cleanup, much of the property was restored to its natural habitat, with ten acres set aside for recreational purposes. Now named the Bruce Vento Nature Sanctuary, the site is maintained by the city, and open to the public. Additional wetlands restoration on the site will continue for several years to come.

As part of its ambitious 110-acre South Jefferson Redevelopment Area revitalization effort, the City of **Roanoke, Virginia**, assembled 25 acres once used for locomotive maintenance and transformed them into the Riverside Center for Research and Technology (RCRT), which includes the world-renowned Carilion Medical Center and Biotechnology Park. The property had been used for locomotive servicing and fueling from the early 1900s until 1959. As time passed, much of the site's rail infrastructure was removed and the roundhouse demolished. A few tracks remained until 2004 to allow access to various industrial uses on the site, including a concrete plant, warehouses, and building supply facilities. Environmental assessments initiated through the Virginia Department of Environmental Quality's Voluntary Remediation Program identified the site's primary environmental concern as a layer of cinder fill material containing various metals and petroleum constituents. These issues were addressed through ICs (i.e., land use restrictions based on the commercial nature of development). In mid-2004, demolition began on the site, after which construction commenced on the medical center.

An initial \$20 million investment by the city through the Roanoke Redevelopment and Housing Authority to establish and administer the redevelopment area, create the redevelopment plans, acquire and assemble property, and perform environmental assessments has leveraged nearly \$200 million in private investment from sources such as the Carilion Biomedical Institute, Carilion Clinic, and Carilion/Virginia Tech Medical School. Now mostly complete, the RCRT will bring high-tech industry growth and new jobs to the area. Local materials were used in construction, and nearly 80 percent of construction waste material was recycled. RCRT developers will eventually seek LEED certification for these green building efforts and other sustainable features of the Center's design.

Category IV – Residential

Definition

Property formerly used for predominately residential purposes.

Background Information

Sites in this category include residential housing areas, mixed commercial/residential sites, private residences adjacent to rail lines, housing located on commercial/industrial properties, apartment buildings with first floor commercial or community space, homes with heating oil tank leaks, and residences on large parcels of land. In some instances, “residential” is merely the assumed land use based on surrounding land usage. There are fewer sites in this category compared to other categories since many residential properties may not have potential contamination issues. However, the potential does exist, especially for homes with heating oil tanks or those adjacent to sites with petroleum contamination (and the possibility of migration). Additionally, there are some circumstances where the original use of a property may have been for purposes such as fueling but it was converted into a residential property decades ago.

Site size ranges from less than .1 acre to more than 850 acres; however, the majority of sites were less than one acre. On the larger site referenced, 850 acres was the entire property size with residential use reported on roughly 10 percent of the property. Petroleum contamination is common at these sites, and lead, other metals, and PAHs are often found during environmental assessments. Soil and groundwater are the most common media affected. When ICs are required, they likely are governmental controls (e.g., zoning, building codes, drilling permit requirements), informational devices (e.g., state registries, deed notices, advisories), and proprietary controls (e.g., easements, covenants). The assumed source of contamination for many current and past residential sites is a leaking heating oil tank.

Reuse Project Examples

There are many examples of reuse projects at sites that fit this category: a century-old residential property in Iowa, a home in Arizona adjacent to railroad tracks, housing within the Naval Ammunition Plant in Nevada, former gasoline stations that were converted to residential use decades ago in New Hampshire, and vacant land in Indiana where maps and historical records determined that a residence had once occupied the site.

In *Kansas City, Kansas*, the South Central Neighborhood Association wished to convert a vacant lot in a residential neighborhood into a community garden. The Association received a grant from EPA’s Brownfields Program in April 2004 to address concerns of potential petroleum contamination from service stations adjacent to the property. After assessments confirmed that petroleum residues fell safely below state standards, the site was redeveloped into a garden with a park, picnic tables, stone pathways, greenspace, and sculptures.



Prescott Community Garden (Source: Kansas Department of Health and Environment)

Two abandoned USTs were discovered on a one-acre residential property in *Lyndeborough, New Hampshire*, when one of the tanks collapsed and created a hole after a Department of Transportation truck filled with gravel drove over the tank. Both tanks contained small amounts of gasoline sludge and were located in close proximity to the street. The current property owner was unaware that the property had originally been used as a gasoline station in the 1930s and 1940s and did not have the resources to remove the tanks. Using \$7,900 in American Recovery and Reinvestment Act (ARRA) funding, the New Hampshire Department of Environmental Services (NHDES) removed the abandoned tanks in December 2009. NHDES routinely encounters abandoned tanks near roadways, and in some cases the properties have been converted to residential use. The local minister and his family continue to live in the home on the property.



Excavation of abandoned gasoline tanks in a residential Lyndeborough neighborhood (Source: NHDES)

Category V – Open Land

Definition

Property predominately unused but environmentally compromised.

Background Information

Most sites in this category include those with petroleum contamination issues but no former land use is known or on record. Such properties might be undeveloped land, parkland, or other forms of greenspace disturbed by an AST on the site, illegal dumping, or contaminant migration from an adjacent site. Most common examples are open land on larger sites with perceived contamination and open land with illegal dumping issues.

In certain geographic areas, such as Oklahoma and Texas, oilfields are by far the most common type of petroleum-contaminated brownfield. Oilfields fall under this category because the footprint related to exploration and drilling activities is relatively small in comparison to the amount of open land surrounding the impacted areas. Residual pollution is often best found using aerial photography since the contamination cannot be seen from a distance at ground level. Actual contamination levels on oilfields vary greatly, from mere surface debris to heavy amounts of petroleum mixed with drilling mud or spilled oilfield brine. These sites are typically rural and often reused as pastures, farmland, hunting leases, wildlife areas, and greenspace. However, around cities such as Tulsa or Houston, suburban communities have been built on old oilfield lands.



Abandoned oilfield before and after cleanup (Source: Oklahoma Corp)

Sites reviewed ranged from less than .1 acre to more than 850 acres; however, the majority of sites were between one and five acres, and almost all were less than 15 acres. Depending on the source of the contamination, asbestos, PAHs, lead, and other metals can be found during environmental assessments. Soil and groundwater are the most common media affected. When ICs are required, they are governmental controls (e.g., zoning, building codes, drilling permit requirements) and informational devices (e.g., state registries, deed notices, advisories).

Reuse Project Examples

There are many different examples of reuse projects at sites in this category that have benefited from EPA Brownfields Assessment and/or Cleanup grants. These include a .9-acre site in Niagara County, New York, with no buildings and a sizeable wooded section where two ASTs operated between the 1970s and 1980s; a 13-acre site with two administrative buildings and the remainder as open land, including four acres of riverfront, owned by a paper mill in New Hampshire; an 80-acre natural resource area in Michigan that was the site of an illegal dump and storage area; undeveloped land used for grazing/ranching in Arizona; and six acres of parkland in Iowa. EPA Section 128a funds, which support state and tribal response programs that address brownfields sites, and state funds have been used to assess and restore abandoned oil well sites in Oklahoma and Texas to productive (agricultural) use.

Summary of Categories

The table below lists the various petroleum brownfields categories, the range of sites that historically have been petroleum brownfields, and the types of sites that could be considered petroleum brownfields.

Categories of Petroleum Brownfields			
Former Land Use	Description	Commonly Observed Petroleum Brownfields Sites ⁸	Additional Petroleum Brownfields Sites ⁹
Commercial	Property formerly used predominately for retail or wholesale of products and services; to serve institutional, public, or civic needs; and commercial agriculture	Gasoline (and diesel) stations or fuel stations, including convenience stores, multi-use sites with gasoline stations on portion of site, garages or repair shops (e.g., automotive, machine, farm equipment), storage, body shops, used car lots, dealerships (e.g., automobile, tire), and agriculture supply stores	<p>Automotive: Cab companies, junkyards, auto or truck salvage, asphalt/pavement companies, auto impound lots, parking lots, race tracks and drag strips, tractor-trailer and RV dealerships, truck stops, commercial driver training facilities, car rentals, and oil change shops</p> <p>General Commercial: Vacant store fronts, vacant supermarkets, retail shopping, hardware stores, auction houses, hotels, motels, warehouses, drive-in movie theaters, tiling companies, farms, landfill buffer areas, communications facilities, office buildings, and land used to service marinas, yacht clubs, or boatyards</p> <p>Public: Schools, hospitals, former national guard sites, job training facilities, correctional facilities, military facilities, fire stations, and churches</p> <p>Agricultural: Retail farm equipment and supply</p>
Industrial	Property formerly used predominately for light-to - heavy manufacturing operations	Bulk storage sites, tank farms (ASTs or USTs), bulk oil and coal storage sites, warehouses, former oil refineries, former manufactured gas plant facilities, food production, grain elevators, and general manufacturing	<p>Manufacturing: Asphalt plants, paint factories, textile, paper and flour mills, agricultural chemicals and seeds, foundries, factories, canneries, automotive plants, plastics manufacturing, welding shops, rubber plants, and iron/metal manufacturing</p> <p>Industrial Facilities: Electric power generation, solid waste transfer stations, raw material stockpiles, slag piles, chemical and dye facilities, sites with hydraulic lifts, scrap yards, burn pits, pump stations, landfills, lumber operations, and feed storage</p> <p>Mining: Strip mines, quarries, and gravel mines and pits</p>
Transportation	Property formerly used predominately to support the movement of goods and services (public or private)	Fleet management sites, transit stations, maintenance facilities, distribution facilities (e.g., oil and coal), pipelines, rail including rail lines on property, rail yards, rail car repair, roundhouses, rail right of ways (ROWs), yard sidings, and switchyards	Shipyards, airports, airfields, terminals, fuel terminals, rail spurs, rail stations, trolley systems, heliports, seaplane bases, port areas, interstate oil and natural gas pipelines and pumping stations, canal systems, trucking fleet service and maintenance facilities, and train depots
Residential	Property formerly used predominately for residential purposes	Mixed use properties that include a residential component, historically residential properties now vacant, housing torn down for commercial reuses, and oilfields in unzoned residential areas	Mobile home parks, RV parks, apartment complexes, homes with heating oil tanks, and towns and suburbs built after World War II over old, abandoned commercial and industrial sites that are now being redeveloped
Open Land	Land is predominately unused but environmentally compromised	Open fields with an AST but never developed, illegal dumping sites, undeveloped land adjacent to contaminated sites, and natural gas or oil exploration and drilling areas typically in open fields	Beaches, other sandy areas, transitional areas (e.g., wetlands) in close proximity to developed land, open space, parks, forested lands from which trees have been removed, and off-road recreational areas

⁸ Sites in ACRES and state tank databases.

⁹ Sites in ACRES and secondary resources (i.e., stakeholder interviews, previous publications) or inferred based on research; common source of petroleum contamination assumed to be an on-site UST or AST.

III: Reuse Case Studies

EPA and states have helped to support petroleum brownfields stakeholders in their efforts to redevelop petroleum brownfields sites for several years. Since 2003, when petroleum-contaminated sites first became eligible for EPA Brownfields grants, the agency has awarded close to \$23 million annually for the assessment and cleanup of petroleum sites. Stakeholder partnerships and funding from EPA and other entities across the federal, state, local, and private sectors have been critical to the successful reuse of petroleum brownfields. It is important to remember that while all sites are unique, stakeholders can learn from those projects that have achieved their petroleum brownfields reuse goals.

The success of efforts to reuse a petroleum brownfields site often depends on a multitude of issues, including ownership complications, community acceptance of reuse plans, migrating contaminants, funding gaps, institutional controls, and ensuring that cleanup standards match intended reuses. Sometimes such complications can delay a project or even halt progress indefinitely. However, in most instances, stakeholders involved in petroleum brownfields reuse can develop strategies to make their projects successful. In each of the following three case studies, the projects overcame significant barriers and transformed petroleum-contaminated brownfields into properties of great value to their surrounding communities.

Commercial: Gasoline Station to Sustainable Community Center – Portland, Oregon

Background

The subject of this case study is a former gasoline station in Portland, Oregon, considered to be a brownfield due to possible contamination from USTs. Located in North Portland in a residential area across from a city park, the property was occupied by an Arco Products Company (ARCO) gasoline station from 1963 to approximately 1989. The facility was identified by the Oregon Department of Environmental Quality (DEQ) as having LUST issues, and in 1989, ARCO excavated five USTs from the site and removed approximately 20 cubic yards of petroleum-impacted soil. In August 1990, DEQ provided ARCO with a No Further Action letter, clearing the path for eventual purchase and redevelopment of the site.

Motivations for Redevelopment

The Portland Alumnae Chapter of the Delta Sigma Theta Sorority, Inc., is an organization of 250 college-educated women from a variety of professions and committed to public service. The organization's mission is to create community projects for the public good.

More than two decades ago, a small group of African American women in the Portland Alumnae Chapter of Delta Sigma Theta decided they needed a home for their chapter and a community center from which they could conduct their outreach projects. June Key, one of the Sorority's alumnae, bought the ARCO gasoline station in 1992 and donated the property to the Sorority.



*Former ARCO gasoline station before reuse
(Source: Nye Architecture, LLC)*

From the beginning of this project, the Sorority sisters did not want just a building but a place that represented progress and inspired others. The Delta Sigma Theta chapter decided to redevelop the former

gasoline station property in a sustainable manner—to both serve as a Living Building Challenge demonstration project and to show that “green” practices can come from grassroots efforts. The Living Building Challenge is a green building rating system created by the International Living Building Institute to recognize buildings meeting the highest level of sustainability. To meet the Living Building Challenge, a building must produce all of its own energy and manage all of its own water on site, as well as use nontoxic, locally-sourced materials. Considered to be among the most stringent green building standards (exceeding even LEED Platinum requirements), meeting the Living Building Challenge would be an ambitious goal for any project, let alone one that was 20 years in the making and that could have failed without the perseverance and dedication of a small group of women.

Some of the design components used by Delta Sigma Theta to meet the Living Building Challenge and have a net-zero impact on the environment include:

- 1) Incorporating recycled metal cargo containers in the design of their approximately 2,700-square-foot public facility to demonstrate options for materials reuse in sustainable design
- 2) Utilizing stormwater management and rain water harvesting systems to demonstrate water conservation strategies
- 3) Incorporating energy-conserving systems (mainly a ground source heat pump) and energy-producing systems (specifically photovoltaics) to demonstrate the feasibility of net-zero energy use in community development projects

Grassroots Redevelopment Strategy

To make the new community center a reality, Delta Sigma Theta used a grassroots strategy, including conducting fundraising efforts and seeking grants and technical assistance. Donations and in-kind community and business support got the project started. A local construction company donated survey work and created a preliminary blueprint in 1992. Through donations, garage sales, and fundraisers the Sorority began to amass the needed funds; however, it was not until a longtime Delta Sigma Theta member willed \$60,000 to the project that a more detailed design phase could begin. Architecture graduate students at the University of Oregon submitted five green designs for the project in 2003, and one was selected.

Little by little, through its outreach efforts and the determination of its members, Delta Sigma Theta continued to build financing for the project’s estimated \$900,000 construction cost. In 2007, Benson Industries, a local manufacturer, donated \$57,000 worth of glass that would otherwise have gone to a landfill to the project. Professionals including architects, hydrologists, consultants, and engineers offered their services either pro bono or for nominal fees. The project’s green redevelopment approach also attracted federal and local grants and technical assistance. In April 2007, the project was awarded more than \$119,000 from Portland’s Bureau of Planning and Sustainability’s Green Investment Fund for reusing salvaged shipping cargo containers in its design. Recycling large shipping containers is an eco-friendly and affordable alternative to using conventional building materials for housing. In 2008, the project received a \$25,000 EPA Sustainability Pilot technical assistance grant that provided recommendations for sustainable stormwater management and reuse and sustainable landscape design to meet the Living Building Challenge. Through an EPA Brownfields Assessment grant, the City of Portland conducted assessments confirming that stormwater infiltration would not destabilize any remaining contaminants, which allowed the designs to be approved by Portland’s Bureau of Development Services.

In March 2010, local support for the project continued in the form of a Commercial Property Redevelopment loan and Storefront Improvement and Community Livability grants totaling over \$430,000 from the Portland Development Commission. With an additional \$25,000 grant from the Tribes of Grand Ronde (Spirit Mountain Casino), enough money had been raised for construction to begin. The Sorority continues to find innovative ways to raise money for additional project costs, including selling etchings on the planned glass doors of the renovated building.

Results

The first phase of construction—which began in August 2010 and was planned for completion in mid-2011—increases the former gasoline station’s building from 1,507 to 2,757 square feet to accommodate a new meeting hall, three restrooms, accessory office space, and a kitchen. Oregon Tradeswomen, a nonprofit that helps women access living wage careers in construction and green jobs through job training programs, provided workers to aid in construction. In February 2011, those workers provided the interior framing for the cargo containers that will become the kitchen and restrooms. The new community center will offer activities such as tutoring sessions for school-age children and youth, activities for seniors, and other neighborhood-oriented activities. The second phase of construction will include transitional housing adjacent to the property, also using shipping containers. Existing open space on the east side of the site will become a community garden.



Construction underway using recycled shipping containers (Source: Nye Architecture, LLC)

Keys to Success/Lessons Learned

- A “green” redevelopment approach can both benefit and challenge a project. This project benefited through successful outreach that helped boost funding. However, meeting green standards can be more demanding and time intensive. In this project, all material going into the project needed to be evaluated to ensure it met Living Building Challenge requirements.
- If a project is ambitious enough and has a story/goal that generates public support, sources of funding can eventually be found.
- Because site design required storm water infiltration on-site, additional site testing was required by the city to determine if any residual contamination might be mobilized. This moved the project schedule back but allayed concerns and allowed the project to continue to pursue the Living Building Challenge.
- From garage sales to federal grants, tap every possible resource to achieve a project’s financial goals. Be creative and innovative in fundraising efforts.

Besides significant in-kind community and business support, Delta Sigma Theta compiled substantial public and private funding sources for the project.

Local Funding	<ul style="list-style-type: none"> • City of Portland Bureau of Planning and Sustainability’s Green Investment Fund • Portland Development Commission • City of Portland Environmental Services • City of Portland Community Benefit Opportunity Program
Federal Funding	<ul style="list-style-type: none"> • US EPA
Private/Nonprofit Funding	<ul style="list-style-type: none"> • Tribes of Grand Ronde Spirit Mountain Community Fund • Rotary Club of Albina • Black United Fund • Energy Trust of Oregon • Legacy Emanuel Hospital Community Services • NIKE Community Grant • Piedmont Rose Connection, Inc. • Individual and business donations

Industrial: Textile Mill to Middle School – Woonsocket, Rhode Island

Background

Located at the northernmost part of Rhode Island bordering the State of Massachusetts, Woonsocket has more than 43,000 residents and is Rhode Island's sixth largest city. Covering a 7.7-square mile area bisected by the Blackstone River, Woonsocket is a historically industrial city: its river frontage made it ideal for the textile mills that proliferated in the mid-1800s. Many of these mills faltered and closed during the Great Depression, though World War II brought a temporary resurgence to the area's textile industry. Though most of Woonsocket's economy has long since shifted from textile production to other more stable types of manufacturing, idle remnants of the city's milling operations are still easily found. With assistance from EPA grants, the city identified more than 320 brownfields representing more than 440 acres of idle and underused land in an area that is almost fully developed.



Woonsocket Middle School in Rhode Island

The 19-acre property at the focus of this case study was assembled from 13 individual brownfields with industrial uses dating back to the 1890s. Facilities on these adjacent parcels processed raw cotton into fabric and dyed textiles. Another adjacent facility processed goat and camel hides to create cashmere. By the late 1960s, many of the lots had been purchased by a single company, American Copper Sponge (later known as ACS Industries), which used the site to manufacture plastic cleaning supplies as well as metal automobile parts. While these uses had ended by the early 2000s, ACS still used the property as an industrial knitting facility until its buildings (as well as those of two neighboring textile companies) were destroyed by a massive fire in 2003. The City of Woonsocket acquired a large portion of the site through tax title in 2004, including the largest remaining mill structure that had been built in 1908. However, the mill building was destroyed by a second fire in 2006.

Environmental Issues

Even before these adjacent parcels were considered for a specific reuse, EPA Brownfields Assessment grants awarded to the city in 2003 and 2006 were used to fund environmental investigations. Conducted by an environmental consulting firm on behalf of the city and the Rhode Island Department of Environmental Management (RIDEM), these assessments revealed a number of environmental issues resulting from former industrial uses as well as the recent fires, including the following.

- **Petroleum in soil:** The multiple mill buildings on these parcels were heated with No. 6 oil, and all had one or more large USTs averaging 25,000 gallons, most dating back 50 years or more—12 USTs in all. Every one of these USTs had leaked, creating significant areas of petroleum contamination. In addition, soil at two other locations contained petroleum from oil used to lubricate industrial machinery.
- **Urban fill-related compounds in soil:** Soil throughout the site contained unsafe concentrations of semi-VOCs and metals. This was likely attributable to the use of urban fill material (e.g., bricks, concrete, ash) during previous development activities, common practice at industrial sites at the time, as well as contamination resulting from the site's long industrial usage.
- **Volatile compounds in soil/groundwater:** A volatile compound known as tetrachloroethene (PCE or PERC), used as an industrial solvent, was detected in unsafe concentrations in the area's soil and groundwater.

Motivations for Redevelopment

Less than three blocks away from this area, Woonsocket's Middle School had its own share of problems. With more than 1,600 students, the school had grown far beyond its original intended capacity, and its structures and facilities were outdated. At the time the first round of environmental assessments was being conducted on these nearby brownfields parcels, the city and school officials were searching for undeveloped land on which to create a new middle school campus—a considerable challenge within Woonsocket's densely-populated boundaries. The city was able to consolidate these adjacent brownfields—with their prime location and existing utility and roadway access—for redevelopment into a new, much needed middle school campus.

Environmental Justice Issues

Given the nature of this project—reuse of contaminated industrial land for a school—it received a great deal of public attention and scrutiny from the beginning. In addition, the targeted area fell within an Environmental Justice Zone designated by EPA and RIDEM. The project gave RIDEM the opportunity to test some newly established public outreach strategies specifically designed for potentially controversial land reuse projects, which included aggressive public outreach and a proactive approach to disseminating project information. A series of public meetings allowed local residents to voice concerns and have their questions addressed, including an initial meeting that explained to the community the details of the planned assessment and cleanup and how comprehensive each of those steps would be. During these meetings, feedback was sought from long-time residents who had actually worked at these former mills to get “inside information” on potential contaminants and areas of concern from those intimately familiar with industrial operations on the site. Public notices on project status and upcoming meetings were printed in the newspaper, and the results of environmental reports were made available at the local library. A project fact sheet was distributed, and direct mailings were sent to parent advisory councils and local teachers. “We didn't want any part of the project to be delayed by people's last-minute concerns, so we put everything out front at every step,” explained Pat Dowling from Fuss & O'Neill, the environmental consulting firm hired for this project. “Gaining the public's trust and confidence was essential to the success of the project. Putting everything out front and being candid about proposed project activities also helped to keep the project on track.”

The Path to Redevelopment

Both preliminary and detailed environmental assessments funded by two \$200,000 EPA Brownfields Assessment grants, one in 2003 and one in 2006, were performed on these assembled parcels. Assessments included drilling 181 soil borings, constructing 67 groundwater monitoring wells, and collecting 340 soil samples, 138 groundwater samples, and 69 soil gas samples—all of which helped to characterize levels and areas of contamination and prepare for cleanup.

A total of \$800,000 in EPA Brownfields Cleanup grants (\$600,000 awarded in 2008 and \$200,000 in 2009); \$95,000 (with a local match of \$19,000) and \$295,000 from the Rhode Island Economic Development Corporation; and nearly \$4 million in additional funding from the city funded the cleanup. Overseen by RIDEM, cleanup of the consolidated site included treatment of groundwater through an innovative process known as reductive dechlorination, which uses natural bacteria to break down contaminants. Eight USTs were removed (four had been removed prior to this project). Replacing all of the site's contaminated soil with clean fill would have been prohibitively expensive; as a solution, the project set up a facility in which soil and other debris could be treated on-site. Mixed with a form of cement, the treated material became a structural aggregate suitable for use beneath new pavement, sidewalks, and structures. With more than 35,000 tons of contaminated soil to treat, this innovative system allowed for soil and other material to be reused for construction as well as made the project financially feasible. By 2008, the city had purchased and

assembled all of the parcels needed to complete this project, and redevelopment began. Construction of the new campus was funded by the city and the State of Rhode Island at a cost of \$72 million.

Keys to Success/Lessons Learned

- Taking a proactive approach to public outreach in this Environmental Justice community was critical to the project's success.
- Because there were so many individual parcels involved, the project required extensive collaboration and coordination with the regulating agencies involved (e.g., RIDEM, EPA, U.S. Army Corps of Engineers), as well as multiple offices within RIDEM itself. Each of these entities and offices needed to be fully informed at every step to avoid confusion and the possibility of conflicting direction.
- Using multiple sources of EPA Brownfields funding, the city and RIDEM had to ensure that each of the 13 individual parcels met grant eligibility requirements.
- Finding a way to treat more than 35,000 tons of contaminated soil on-site—rather than off-site soil disposal and replacement with clean fill—not only made this project financially feasible, the process created a safe, concrete-like aggregate used in construction of the new campus.

Project Results

In January 2010, based on the results of continued environmental testing and monitoring, RIDEM issued a Letter of Compliance for the entire property. The new middle school campus opened to students that same month. The largest middle school facility in all of New England, this property is now home to two middle schools, a multi-purpose athletic complex, and parking areas, as well as a forthcoming bicycle path. In an area known for high unemployment and poverty rates, the cleanup and restoration of these assembled brownfields is seen as a cornerstone for continued economic and aesthetic revitalization. This project is expected to attract private investment to the community, catalyze additional redevelopment, and increase surrounding property values. Just a few blocks away, Woonsocket's former middle school site is now planned for redevelopment into a senior housing complex.

Industrial: Fuel Depot and Bulk Storage Terminal to Housing – Alexandria, Virginia

Background

Located in northern Virginia and bordering the Potomac River and Washington, D.C., Alexandria is one of the oldest and most historic cities in the country. Incorporated in 1749, the city was a shipping port and by the end of the 18th Century was one of the ten busiest ports in the country. The city played a vital role in some of the nation’s major conflicts, including the Civil War and World Wars I and II. As the government expanded in the years following World War II, the city became a residential suburb of Washington, D.C., though its history left Alexandria with a legacy of former industrial sites.

Located in the heart of Alexandria’s “Old Town” district, the Fannon Oil site operated as a fuel depot and bulk storage terminal since the 1880s. During that time, petroleum was delivered to the site by rail, and the depot served the surrounding community’s fuel needs, including coal and firewood. In 1962, the owner upgraded the depot by constructing a bulk oil terminal that included many ASTs as well as USTs, with a combined capacity of over 500,000 gallons. At the height of operations in 1982, Fannon Oil was selling between 15 and 18 million gallons of product per year.

Environmental Issues

Despite the critical role that the Fannon Oil terminal played for the community of Alexandria, its age and sheer volume of storage capacity led to significant contamination issues. In 1982, a petroleum release from the site was detected by city workers performing routine utility maintenance work in the surrounding area. The level of contamination was so severe that initially the workers thought that they had struck an underground oil pipeline. Officials believed that the petroleum contamination had been released from the Fannon Oil site but did not fully understand the migration pathway. The Virginia Department of Environmental Quality (DEQ) required the installation of monitoring wells that revealed that petroleum products migrating from the site were as much as 40 inches thick. Recovery wells were constructed and operated by Fannon Oil and eventually recovered nearly 27,000 gallons of petroleum product from affected areas. In the late 1990s, additional monitoring wells indicated that contamination from Fannon Oil had migrated to other off-site properties. In response, a groundwater pump-and-treat system was installed and began operation in 2001. A soil vapor extraction system was also installed to mitigate the vapors that permeated soils.

While these systems were effective at mitigating individual releases of petroleum contamination, there was a need to address the site holistically and consider future reuses. According to Randy Chapman, DEQ case manager, the question being asked by the city and neighbors was, “Why do we still have a bulk [petroleum] distribution plant in Old Town?” The need for change on the site was clear, but without a complete understanding of the site’s contamination or a cleanup plan, there was little hope for redevelopment. In response, DEQ chose the Triad approach, defined by EPA as “an innovative approach to



Twenty-eight USTs were excavated and removed from the site during cleanup



Water treatment system installed in a basement to mitigate the threat of contaminated water entering the city’s stormwater system

decision-making for hazardous waste site characterization and remediation... [that] proactively exploits new characterization and treatment tools, using work strategies developed by innovative and successful site professionals.” With some technical assistance from EPA, DEQ, and the property owner’s environmental consultant, the Triad approach was implemented for the Fannon project.

Part of the Triad approach was an innovative solution for characterizing the contamination on the site. As an alternative to the long-term installation of monitoring wells, a technology known as membrane interface probes (MIP) provided real-time, three-dimensional maps of the site’s petroleum contamination in only two weeks. Cleanup of the site involved the excavation and removal of 28 USTs, underground piping, and 35,000 tons of petroleum-contaminated soil. A number of off-site extraction wells and pump-and-treat systems were also installed to remove petroleum contamination from groundwater. These systems treated more than six million gallons of groundwater and removed over 5,000 pounds of contaminants such as petroleum hydrocarbons, benzene, toluene, and methyl-tertiary-butyl ether (MTBE); 5,000 gallons of fuel oil; and 7,000 pounds of subsurface petroleum vapors. DEQ issued a case closure letter for the terminal property in April 2009 but further directed the property owner to continue remediation in the surrounding area. The entire cleanup of the area is reaching completion, and DEQ expects to issue a case closure letter by September 2011.

The Approach to Redevelopment

Aside from the obvious environmental conditions that resulted from the property’s previous uses, the surrounding community had grown in ways incompatible with this large industrial site. The owner of Fannon Oil had long recognized that the property needed to be cleaned up and redeveloped but could not cease operations unless: (1) a new location for the bulk oil terminal could be found; (2) a viable developer/buyer was identified; and (3) the property fetched a fair market price. In 2000, DEQ met with the owner and environmental consultant to strategize about cleanup and redevelopment. Chapman remembers, “We all came together and sat down to think outside the box.” This meeting led to further discussion and the realization that despite the property’s environmental issues, the value of the land could make cleanup and redevelopment financially viable.



A view of The Duke row homes from West Street in Old Town Alexandria

Eventually, the property owner and the potential developer, Van Metre Homes, reached an agreement on the terms of cleanup and sale. Fannon Oil was able to build a new bulk oil terminal in neighboring Prince William County and move its operations; this new facility uses modern technology and safety precautions that will reduce the risk of any future releases. Once cleanup was complete, Van Metre began construction on The Duke Townhomes and Flats, a mixture of street-level row homes and apartments, and completed construction in 2010. As part of development, the city required Van Metre to install additional ICs beyond what the state required as an added factor of safety for future residents and the environment. The new Duke Townhomes and Flats represent many smart growth attributes, including infill redevelopment; a pedestrian-friendly neighborhood with shops, restaurants, and grocery stores within easy walking distance; and transportation options, including a Metro stop just a few blocks away.

Funding and Technical Assistance

Cleanup was funded primarily through an arrangement between Fannon Oil's owner and the developer Van Metre. In addition, the project made use of the Virginia Petroleum State Tank Fund (VPSTF), which is used to clean up petroleum releases on storage tank sites throughout the Commonwealth and is financed through a state fee of one-fifth to three-fifths of one cent per gallon on regulated petroleum products. Depending upon the type of petroleum storage tank, owners/operators may request access to the Fund either for cleanup costs only or for both cleanup and third-party costs. The owner/operator is eligible to request reimbursement from the Fund for costs that exceed his Financial Responsibility Requirement (deductible) for cleanup (and if applicable, third-party damages) up to a maximum of \$1 million per occurrence. In the case of this property, since the cleanup cost was so large, DEQ had to decide how best to leverage the Fund resources to meet cleanup goals and be consistent with the site's redevelopment plans. DEQ determined that the owner was eligible to access the Fund for \$1 million for each of the three identified releases (occurrences) on the property—\$3 million total—and that the owner would pay \$50,000 per release, or \$150,000, in deductibles. VPSTF funding was ultimately used for the project's initial assessments, MIP survey, pump-and-treat systems, recovery wells, and a large portion of the soil excavation and dewatering costs.

Community Engagement

Community engagement and involvement were essential to the success of this project. Early on, stakeholders that included community representatives were convened to hold discussions on the property's reuse. In mid-2006, a public meeting was held to discuss the environmental plans and what would occur during the development. In addition, the city and DEQ also met with adjacent homeowners' associations, civic associations, and other stakeholders to discuss the project and address any concerns.

Keys to Success:

- Stakeholder engagement was important. Because the project involved multiple entities, it was essential that all parties met and collaboratively developed a strategy for moving forward. This allowed for better information exchange and kept the community informed about long-term goals.
- The membrane interface probe tool provided real-time, low-impact characterization of the site's contamination and finally allowed parties to develop a cleanup strategy.
- The Virginia Petroleum State Tank Fund provided financial incentives for site cleanup.

IV: Petroleum Brownfields Resources

Reusing brownfields with known or uncertain issues with any contaminant, let alone petroleum, can be complex and may require multiple sources of funding and technical assistance. In some cases, financial incentives (e.g., tax incentives, property transfers) rather than direct funding may be equally valuable. While not comprehensive, this section of the report provides a list of federal, state, and other funding and technical assistance resources available for petroleum brownfields projects. Stakeholders need to remember that depending on how the site is defined as a petroleum brownfield, the resources may or may not apply to each site. It is strongly encouraged that stakeholders review the eligibility requirements for all resources before investing time to secure these resources.

In addition to the following table of resources, there are four particularly helpful and often used sources of additional information from EPA on funding and financial support for petroleum brownfields projects:

- The **Brownfields Federal Programs Guide** (2011). EPA compiled this catalog of technical and financial support for the cleanup and redevelopment of brownfields.

Link: www.epa.gov/brownfields/partners/bf_fed_pr_gd.htm

- **A Guide to Federal Tax Incentives for Brownfields Redevelopment** (2011) provides an overview of the key federal tax incentives and credits that can be leveraged for brownfields cleanup, redevelopment, and reuse – excerpted from the Brownfields Federal Programs Guide.

Link: www.epa.gov/brownfields/tax/tax_guide.pdf

- EPA’s Office of Solid Waste and Emergency Response (OSWER) **Grants and Funding** Web Page lists a variety of grants and other funding options, many of which are available to petroleum brownfields projects.

Link: www.epa.gov/oswer/grants-funding.htm

- **Funding and Financing for Brownfields** Web Page provides information about other brownfields-related money matters, such as federal brownfields funding sources and financial issues and incentives.

Link: www.epa.gov/brownfields/mmmatters.htm

Helpful Tips for EPA Petroleum Brownfields Proposals

EPA petroleum brownfields funding for assessment, revolving loan fund, and cleanup grants is a competitive national funding opportunity, and applications must be well prepared. Consider these tips when creating a proposal:

- Answer all questions completely.
- Tell a compelling story.
- Address all criteria.
- Avoid acronyms and organizational jargon.
- Use the proposal checklists to ensure a complete submission.
- Involve the community from the beginning, including the proposal stage.
- Proofread and spell check your application.
- Peer review the application for feedback.
- Be clear on the ownership of sites.
- Contact your state for petroleum site eligibility early.
- Avoid maps and photos.
- Make sure the budget is clear and detailed.

Some EPA Regions offer Grant Writing Workshops; contact your EPA Regional Office for more information.

National Resources

Type of Resource				Title	Description
Funding (e.g., grants, incentives)	Technical	Partner	Informational		
U.S. Environmental Protection Agency Resources					
X	X	X	X	Brownfields Program	EPA has funding and technical assistance tools and resources for communities looking to plan for the redevelopment of petroleum brownfields. In addition to providing financial support through the grant programs listed, EPA provides information on specific technical aspects of planning for redevelopment, such as land use and institutional controls. Other tools include facilitation support, visioning tools, and links to regional regulatory or hazardous substance research consortia. Link: http://epa.gov/brownfields/
X				CERCLA Section 128(a) Grants	Section 128(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, authorizes a noncompetitive \$50 million grant program to establish and enhance state and tribal response programs. Generally, these response programs address the assessment, cleanup, and subsequent redevelopment of brownfield sites and other sites with actual or perceived contamination. Link: www.epa.gov/brownfields/applicat.htm
X				Brownfields Assessment Grants	Competitive grant program where grant recipients use funding for inventory, characterization, assessments, and conducting planning and community involvement related to Brownfields within a three-year time limit. Awards are given in amounts up to \$200,000 for sites contaminated with hazardous substances, pollutants, or contaminants. Petroleum brownfield sites may request up to the same amount. Special cases exist where applicants can request up to \$1,000,000. Link: www.epa.gov/brownfields/assessment_grants.htm
X				Brownfields Revolving Loan Fund Grants	Competitive grant program that awards grants to entities such as states and tribes to create low-interest loans for carrying out cleanup activities at brownfield sites. Repaid loans are returned to the fund for future borrowers. Link: www.epa.gov/brownfields/rflst.htm
X				Brownfields Cleanup Grants	Competitive grant program that awards up to \$200,000 (with a five-site limit under one grant) to carry out cleanup activities at Brownfields with petroleum and hazardous substances, pollutants, or contaminants. This grant requires a 20 percent cost share that may be waived depending on hardship. Link: www.epa.gov/brownfields/cleanup_grants.htm
	X			Targeted Brownfields Assessments (TBA)	Provides technical assistance to those states, tribes, municipalities, nonprofits, and other eligible entities for diminishing the uncertainties of contamination often associated with Brownfields and promoting their cleanup and subsequent redevelopment. TBA is not a grant program but a service provided through an EPA contract in which EPA directs a contractor to conduct environmental assessment activities. Link: www.epa.gov/brownfields/grant_info/tba.htm

Type of Resource				Title	Description
Funding (e.g., grants, incentives)	Technical	Partner	Informational		
U.S. Environmental Protection Agency Resources (continued)					
	X			Technical Assistance to Brownfields Communities (TAB)	TAB grants provide technical assistance and training on Brownfields assessment, remediation, and subsequent redevelopment/reuse through independent resources. Link: http://epa.gov/brownfields/tools/index.htm#tab
	X		X	Hazardous Waste Clean-Up Information (CLU-IN) Website	EPA created the CLU-IN website to disseminate information on contaminants, cleanup technologies, strategies, and other resources for cleaning up hazardous waste. Many of the resources listed on the website apply to petroleum brownfields. Link: www.clu-in.org/
	X		X	Road Map to Understanding Innovative Technology Options for Brownfields Investigation and Cleanup, 4 th Edition (2005)	EPA produced this guidance document to assist in the identification and selection of innovative technologies for site characterization and cleanup during the brownfields redevelopment process. Link: www.brownfieldstsc.org/roadmap/home.cfm
X	X		X	Training, Research, and Technical Assistance Grants	Authorized under CERLCA, these grants provide funding for training, research, and technical assistance to facilitate Brownfields revitalization. Link: www.epa.gov/brownfields/trta_k6/index.htm
	X		X	Sustainable Design and Green Building Toolkit for Local Governments	This toolkit assists local governments in identifying and removing barriers to sustainable design and green building within their existing codes/ordinances and permitting processes. Link: www.epa.gov/region4/recycle/green-building-toolkit.pdf
	X		X	Smart Growth Implementation Assistance (SGIA) Program	SGIA is a competitive program where communities receive direct technical assistance from a team of national experts to help incorporate smart growth strategies into planning efforts for future development. Link: www.epa.gov/smartgrowth/sgia.htm
X				Area-Wide Planning Pilot Program	Competitive grants of approximately \$175,000 to support community involvement in the assessment, cleanup, and subsequent reuse of brownfields in an area-wide context. Link: www.epa.gov/brownfields/areawide_grants.htm
X				Environmental Workforce Development and Job Training Grants	Provides funding to nonprofit organizations and other eligible organizations to recruit, train, and place low-income and minority unemployed and under-employed residents residing within solid and hazardous waste-impacted communities. Training aims to provide residents with the skills needed to secure employment in the environmental field to perform assessment and cleanup work within their communities. Link: www.epa.gov/brownfields/job.htm#gra
	X		X	Local Government Planning Tool to Calculate Institutional and Engineering Control Costs for Brownfield Properties	This cost calculator is designed as a voluntary guide for local governments to assist in calculating their expected costs of implementing and conducting long-term stewardship of institutional controls and engineering controls at brownfields properties. Link: www.epa.gov/brownfields/tools/ic_ec_cost_tool.pdf

Type of Resource				Title	Description
Funding (e.g., grants, incentives)	Technical	Partner	Informational		
U.S. Environmental Protection Agency Resources (continued)					
X				Brownfields Tax Incentive	Environmental cleanup costs, including those related to petroleum brownfields, are fully deductible in the year incurred to promote the cleanup and recycling of brownfields. Improvements in 2006 expanded the tax incentive to include petroleum cleanup. Link: www.epa.gov/brownfields/tax/index.htm#about
X				Environmental Justice Grants	Provides funding through a competitive grant process to eligible organizations to build partnerships, identify the local environmental and/or public health issues, and envision solutions and empower the community through education, training, and outreach. Link: www.epa.gov/compliance/ej/grants/index.html
X				Community Action for a Renewed Environment (CARE)	A competitive grant program that provides direct funding to local governments or health departments to address environmental conditions in their communities. This includes funding for environmental assessments at brownfields. Link: www.epa.gov/care/
	X		X	Brownfields Redevelopment Toolbox for Disadvantaged Communities (2008)	Provides technical guidance and resources for disadvantaged communities that face even larger obstacles due to crime, depressed property values, environmental justice issues, etc., to help reverse the trends and restore economic vitality to these communities. Link: www.epa.gov/brownfields/tools/bftoolbox_disadvantage_communities.pdf
			X	RE-Powering America's Land Initiative	Helps stakeholders identify the renewable energy potential of currently and formerly contaminated land and mine sites. Provides useful resources for communities, developers, industry, and state and local governments interested in reusing these sites for renewable energy development. Link: www.epa.gov/renewableenergyland/
Other Federal Resources					
X		X	X	U.S. Department Housing and Urban Development (HUD) – Community Development Block Grant Program	HUD provides block grants and other competitive awards for promoting economic and community development and revitalization projects in distressed areas. (Community Development Block Grant Program; Section 108 Loan Guarantee Program; HOME Investment Partnership Program; Empowerment Zones and Enterprise Communities Initiative; Lead-Based Paint Hazard Control Grant Program). Link: www.hud.gov/offices/cpd/economicdevelopment/programs/rc/resource/brwnflds.cfm HUD is also a partner with EPA and the U.S. Department of Transportation (DOT) in the <i>Partnership for Sustainable Communities</i> . Link: http://portal.hud.gov/hudportal/HUD?mode=disppage&id=OSHC_PART_SUST_C OMM

Type of Resource				Title	Description
Funding (e.g., grants, incentives)	Technical	Partner	Informational		
Other Federal Resources (continued)					
X	X	X	X	U.S. Department of Transportation (DOT) Federal Highway Administration (FHWA)	FHWA implemented the Transportation and Community and System Preservation program to provide grants and research funding to help build sustainable communities, including the redevelopment of brownfields. Link: http://www.fhwa.dot.gov/tcsp/00sect2.html FHWA also works to include brownfields redevelopment in their transportation planning and provides technical assistance to communities regarding brownfields redevelopment planning. Link: www.fhwa.dot.gov/environment/bf_disc.htm DOT is also a partner with EPA and HUD in the <i>Partnership for Sustainable Communities</i> . Link: http://fta.dot.gov/publications/publications_10935.html
X	X	X	X	U.S. Department of Commerce Economic Development Administration (EDA)	EDA offers technical assistance and provides planning grants, revolving loan funds, and loan guarantees to stimulate private investments for infrastructure construction related to brownfields. Link: www.eda.gov/Research/Brownfields.xml
	X	X	X	U.S. Department of Energy (DOE) Energy Efficiency and Renewable Energy	The Building Technologies Program (BTP) funds research and technology development to reduce commercial and residential building energy use. The resources available through BTP can help ensure that once brownfields cleanup is achieved, redevelopment is energy efficient and sustainable. Link: http://www1.eere.energy.gov/buildings/
	X	X	X	U.S. Department of the Interior (DOI) National Park Service (NPS) Groundwork USA	The Groundwork Initiative pilot program is funded through the EPA Brownfields Program and receives technical assistance from the NPS Rivers and Trails Program to improve neighborhoods with brownfields by reclaiming land for community parks and gardens. Link: www.nps.gov/ncrc/programs/rtca/whoweare/www_partners_GW.html Link: www.epa.gov/brownfields/policy/initiatives_co.htm#qt
X		X	X	DOI NPS –Technical Preservation Services	The NPS administers a 20 percent federal tax credit to restore and rehabilitate historical buildings, including those that are now deemed brownfield sites. Link: www.nps.gov/hps/tps/tax/incentives/index.htm
X	X	X	X	Department of Health and Human Services (HHS) Agency for Toxic Substances and Disease Registry (ATSDR) Brownfield/Land Reuse Initiative	Works with communities to incorporate health into sustainable redevelopment activities. Provides grants to assess health issues associated with redevelopment plans and tools and technical assistance for community involvement. A recent publication, <i>Leading Change for Healthy Communities and Successful Land Reuse</i> , highlights brownfields redevelopment projects with health-related reuses. Link: www.atsdr.cdc.gov/sites/brownfields/index.html
X		X	X	U.S. Department of Justice (DOJ)	DOJ's Community Capacity Development Office instituted the "Weed & Seed" Program designed to assist communities with crime prevention and control (e.g., cleaning up illegal drug labs), which may indirectly affect redevelopment by promoting revitalization activities in distressed areas where abandoned and/or underutilized properties are located. Link: www.ojp.gov/ccdo/ws/welcome.html

Type of Resource				Title	Description
Funding (e.g., grants, incentives)	Technical	Partner	Informational		
Other Federal Resources (continued)					
	X	X	X	U.S. Department of Defense U.S. Army Corps of Engineers (USACE) Urban Waters	Supports local communities and military installations with planning, design, construction, management, contracting, and operations. Also provides engineering technical assistance related to hazardous contaminant remediation, flood hazard mitigation, etc. Link: https://environment.usace.army.mil/what_we_do/brownfields/
X	X	X	X	Appalachian Regional Commission (ARC)	Provides funding to state and local governments for economically-distressed counties in the Appalachian Region. Although ARC does not have any brownfields-specific programs, the agency's current strategic plan seeks to raise awareness of and leverage support for the reclamation and reuse of brownfields. Brownfields are also a key element of ARC's Asset-Based Development initiative. Link: www.arc.gov/abd
X		X	X	U.S. Small Business Administration (SBA)	Provides support for small businesses. SBA provides information and other non-financial technical assistance for redevelopment efforts – targeted to small businesses. Link: www.sba.gov/content/cleanup
Nonprofit Organization Resources					
	X		X	The Brownfields and Land Revitalization Technology Support Center (BTSC)	Provides support to federal, state, local, and tribal officials for brownfields redevelopment efforts. Also delivers technical support, provides information on technologies, and reviews project documents. Link: www.brownfieldstsc.org/
	X	X	X	National Association of Development Organizations (NADO)	Offers technical assistance related to brownfields redevelopment and economic revitalization to regional development organizations across the U.S. Link: www.nado.org/
		X	X	International City/County Management Association (ICMA)	Provides information on brownfields for local governments and communities in the form of books, newsletters, blogs, question and answer forums, and other publications. Also posts links to websites that provide further knowledge on brownfields. Link: www.icma.org/main/topic.asp?tpid=19&hsid=10
	X	X	X	National Association of Local Government Environmental Professionals (NALGEP)	Sanctions communities to revitalize their towns with strategies, tools, and best practices for brownfields cleanup and reuse by offering advice on green and sustainable redevelopment. Link: www.nalgep.org/issues/brownfields/
		X	X	Northeast-Midwest Institute (NEMW)	The Institute is a resource for communities to obtain information (best practices, sustainable development, etc.) on the environmental cleanup and economic redevelopment of brownfield sites. Link: www.nemw.org/index.php/current-initiatives/current-initiatives-brownfields
	X	X	X	New England Interstate Water Pollution Control Commission (NEIWPC)	A resource for technical assistance relating to LUST and UST topics, including a LUSTLine newsletter, training videos, and points of contact for further information. Link: www.neiwpc.org/ust.asp

Type of Resource				Title	Description
Funding (e.g., grants, incentives)	Technical	Partner	Informational		
Nonprofit Organization Resources (continued)					
		X	X	Rails-to-Trails Conservancy (RTC)	Provides a toolbox to help stakeholders learn the basics of trail-building, including corridor research, railbanking, acquisition, outreach, trail design, and trail management and maintenance. Link: www.railstotrails.org/ourwork/trailbuilding/toolbox/index.html
		X	X	International Economic Development Council (IEDC)	IEDC is a nonprofit membership organization for economic developers that provides information on a range of brownfields topics from brownfields redevelopment to tips on conducting charettes. Also provides website links to other brownfields resources. Link: www.iedconline.org/?p=Brownfields_Resource_Center
			X	Database of State Incentives for Renewables and Efficiency (DSIRE)	Provides information on state, local, utility, and federal incentives and policies that promote renewable energy and energy efficiency. Link: www.dsireusa.org/
	X	X	X	Community Brownfields Foundation	Provides technical assistance, project team training, community education, strategic real estate, and economic development services. Link: www.communitybrownfields.com

State Resources

Each state offers unique tools, resources, and technical assistance for brownfields. Stakeholders are encouraged to learn more about their state programs via state brownfields, UST/LUST, and UST fund websites and consult their appropriate state contact(s) for more information, as needed. Many states offer a state voluntary cleanup program (VCP) that supports brownfields cleanup and subsequent reuse activities, and a state may also have an UST program that oversees regulated tank sites. The state program to contact (e.g., state brownfields or UST program) will depend on whether a site is identified as regulated.

State Voluntary Cleanup Programs

State VCPs are mechanisms to support the cleanup and subsequent reuse of brownfields by addressing environmental, financial, and legal obstacles. These programs provide a mechanism to conduct cleanup and obtain No Further Action determinations for sites where cleanup is not specifically regulated by other federal or state regulatory programs. VCPs lend support and technical assistance to property owners or developers who choose to voluntarily clean up their sites. These programs provide a streamlined approach to assessment and cleanup by focusing on the reduction of human and environmental risk and allowing real estate transactions and/or redevelopment to proceed. Furthermore, parties not responsible for the presence of contamination on a site, such as future owners and leasers, can receive liability protection by complying with the requirements of these programs. EPA's publication, *State Brownfields and Voluntary Response Programs: An Update from the States*, provides a concise, user-friendly synopsis of the programs and tools available through state programs and can be found at: www.epa.gov/brownfields/state_tribal/pubs.htm#sta. A list of state brownfields program websites can also be found in the Appendix of this report.

State Underground Storage Tank (UST) Programs

Many states have separate UST programs that oversee the regulation and cleanup of tank sites. UST programs cover tanks (and certain pipes connecting them) storing petroleum products or other hazardous chemicals. When these tanks begin to leak, they can contaminate soil and groundwater. Cleaning up a leaking UST (LUST) can cost anywhere from \$10,000 to \$1,000,000 depending on the extent of the contamination. The average cleanup is estimated to cost \$125,000.¹⁰ For more details, please check with your state UST, LUST, and/or tank fund program, which can be found in the Appendix.

State Financial Assurance Funds

Some states have financial assurance funds that reimburse tank owners for the cost of cleanup at eligible releases and may also provide direct funding for cleanup. Property owners dealing with regulated sites can check if funding is available to help offset cleanup costs. There is great variability among states regarding which agency or office oversees state financial assurance funds. The Association of State and Territorial Solid Waste Management Officials (ASTSWMO) conducts an annual state financial assurance fund survey that includes information such as responsible agency, fund coverage, sources of funds, and average cleanup costs. For more information on ASTSWMO's annual state fund survey, visit: www.astswmo.org/Pages/Policies_and_Publications/Tanks.htm. For additional information on state financial assurance funds, visit: www.epa.gov/oust/states/fndstatus.htm.

¹⁰ Source: <http://www.epa.gov/oust/ltffacts.htm>

Other state and tribal resources include:

State and Tribal Response Programs Web Page	This EPA Web page provides further links to background information, state and tribal grant funding guidance, MOUs, MOAs, state brownfields websites, and state VCP websites. Link: www.epa.gov/brownfields/state_tribal/index.html
Association of State and Territorial Solid Waste Management Officials (ASTSWMO)	ASTSWMO provides services and information to states and territories on programs and policies related to solid waste management. ASTSWMO works closely with EPA to bring awareness and technical assistance to its members on the most current developments relating to waste and sustainability programs (e.g., petroleum brownfields programs). Link: www.astswmo.org
State Economic Development Agencies	State economic development agencies help distressed communities develop economic growth, including infrastructure and brownfields redevelopment projects. Links to state economic development agencies are available at: www.eda.gov/Resources/StateLinks.xml
State Oil and Gas Cleanup Funds	States such as Oklahoma (www.oerb.com/WellSiteCleanup/tabid/60/Default.aspx) and Texas (www.rrc.state.tx.us/environmental/ofcfund/index.php) have oilfield cleanup funds that can be accessed for oilfield sites.
Oil and Gas Agency Well-Plugging Funds	Many states from Ohio to Texas have a fund for plugging abandoned wells that were not plugged at all or to modern standards. When these wells have leaked or are leaking petroleum, the funds can be accessed to stop further pollution and sometimes to perform a limited area cleanup.

Local and Private Resources

Local Resources

Local governments can create and implement a variety of financing tools to help spur brownfields redevelopment, including sites impacted by petroleum contamination. Typical financing tools used by local governments for cleanup and redevelopment may include, but are not limited to, the following:

- **Tax Increment Financing (TIF) Districts:** Cities create TIF Districts to make public improvements within those districts that will generate private-sector development. In these districts, the current tax rate is frozen while area improvements or development occur. Tax increases in property assessment value after redevelopment go into a special bond fund or are used for future growth in the district.
- **Tax Credits:** A tax credit lowers the amount of income tax owed by a tax payer.
- **Tax Abatements:** Cities or counties may agree to reduce taxes owed or exempt property owners from paying property taxes for a period of time in order to spur economic development.
- **Locally Capitalized and Operated Revolving Loan Funds:** Typically fixed-rate, low-interest and/or long-term loan funds that supplement or leverage private financing, often capitalized with dollars that do not have to be repaid and sustained through the repayment of principal and interest.
- **General Obligation Bonds:** Locally issued bonds for purposes including land acquisition, site preparation, or infrastructure improvements.

Private/Other Resources

In most brownfields redevelopment projects, private-sector involvement (e.g., private developers) is a major component. Once a site's contamination uncertainties are cleared up, the private sector often steps in to pay for cleanup and redevelopment in recognition of the site's value for reuse. Listed below are examples of funding (and in some cases, technical) assistance resources from the private sector:

- Nonprofit groups, like Habitat for Humanity or environmental organizations;
- In-kind contributions from local businesses (e.g., materials donations, services);
- Private foundations (e.g., through competitive grant programs);

- University support, typically in the form of technical assistance;
- Community Development Financial Institutions (CDFIs) provide credit, capital, and financial services to underserved communities; and
- Real Estate Investment Trust (REIT) acts as owner with private investor funds that shields investor liability.

V: Conclusion

This report explores the potential of petroleum brownfields and the myriad creative and beneficial ways they can be returned to use. While addressing these sites can be complicated due to regulations and the different programs and agencies that are often involved, the examples within this report illustrate that success is often a matter of identifying the right resources, tools, and partners to complete a reuse project. This report was developed to help broaden stakeholder understanding of the types of sites likely to be considered petroleum brownfields. It also offers links to resources and technical assistance opportunities to assist stakeholders with petroleum brownfields reuse projects. Ideally, the information and guidance offered in *Opportunities For Petroleum Brownfields* will help you address sites with potential petroleum contamination issues in your area, leading to a reuse that will benefit you and your community.

Appendix

Provided below are website links, organized alphabetically by state or territory, to the following state or territorial programs: brownfields, UST/LUST, and UST fund (state financial assurance fund). Most petroleum brownfields funding and technical assistance will be found within state brownfields programs, since UST/LUST and UST fund programs are geared toward regulated tank sites rather than petroleum brownfields. However, some state programs work together to address site assessment and cleanup. Please check with your state or territorial contact to determine a site's eligibility under a selected program. *Note:* Where "n/a" (not applicable) is indicated, it does not necessarily mean that the state does not have a particular program or fund but that a related website could not be found.

ALABAMA
State brownfields website: <ul style="list-style-type: none"> http://adem.alabama.gov/programs/land/brownfields.cnt
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> www.adem.state.al.us/programs/water/groundwater.cnt
State UST fund website: <ul style="list-style-type: none"> www.adem.state.al.us/programs/water/groundwater.cnt

ALASKA
State brownfields website: <ul style="list-style-type: none"> www.dec.state.ak.us/spar/csp/brownfields.htm
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> www.dec.state.ak.us/spar/ipp/ust.htm
State UST fund website: <ul style="list-style-type: none"> www.dec.state.ak.us/spar/rfa/index.htm

AMERICAN SAMOA
State brownfields website: <ul style="list-style-type: none"> http://asepa.gov/site-assessment-remediation.asp
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> http://asepa.gov/hazardous-materials.asp
State UST fund website: <ul style="list-style-type: none"> n/a

ARIZONA
State brownfields website: <ul style="list-style-type: none"> www.azdeq.gov/environ/waste/cleanup/brownfields.html
Are petroleum brownfields included in brownfields program? Depends - crude oil is excluded.
State UST/LUST program website: <ul style="list-style-type: none"> www.azdeq.gov/environ/waste/ust/index.html
State UST fund website: <ul style="list-style-type: none"> www.azdeq.gov/environ/waste/ust/saf/index.html

ARKANSAS
State brownfields website: <ul style="list-style-type: none"> • www.adeg.state.ar.us/hazwaste/bf/default.htm
Are petroleum brownfields included in brownfields program? Depends - petroleum sites are ineligible for some funding.
State UST/LUST program website: <ul style="list-style-type: none"> • www.adeg.state.ar.us/rst/
State UST fund website: <ul style="list-style-type: none"> • www.adeg.state.ar.us/rst/branch_programs/trustfund.htm

CALIFORNIA
State brownfields website: <ul style="list-style-type: none"> • www.dtsc.ca.gov/SiteCleanup/Brownfields/
Are petroleum brownfields included in brownfields program? Depends - petroleum contamination from non-UST releases is eligible. State Water Resources Control Board regulates petroleum hydrocarbons.
State UST/LUST program website: <ul style="list-style-type: none"> • www.waterboards.ca.gov/water_issues/programs/ust/
State UST fund website: <ul style="list-style-type: none"> • www.waterboards.ca.gov/water_issues/programs/ustcf/

COLORADO
State brownfields website: <ul style="list-style-type: none"> • www.cdphe.state.co.us/HM/rpbrownfields.htm
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.colorado.gov/cs/Satellite/CDLE-OilPublicSafety/CDLE/1240336920113
State UST fund website: <ul style="list-style-type: none"> • http://oil.cdle.state.co.us/OIL/Fund/fundindex.asp

CONNECTICUT
State brownfields website: <ul style="list-style-type: none"> • www.ct.gov/dep/cwp/view.asp?a=2715&q=324950&depNav_GID=1626
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.ct.gov/dep/cwp/view.asp?a=2692&q=322600&depNav_GID=1652&depNav=
State UST fund website: <ul style="list-style-type: none"> • www.ct.gov/dep/cwp/view.asp?a=2717&q=325322&depNav_GID=1652

DELAWARE
State brownfields website: <ul style="list-style-type: none"> • www.awm.delaware.gov/SIRB/Pages/Brownfields.aspx
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.dnrec.state.de.us/dnrec2000/Divisions/AWM/ust/
State UST fund website: <ul style="list-style-type: none"> • www.dnrec.state.de.us/dnrec2000/Divisions/AWM/ust/firstfund/default.asp

DISTRICT OF COLUMBIA
State brownfields website: <ul style="list-style-type: none"> • http://doh.dc.gov/doh/cwp/view,a,1374,Q,58643%205,dohNav_GID,1812,.asp
Are petroleum brownfields included in brownfields program? n/a - list under development
State UST/LUST program website: <ul style="list-style-type: none"> • http://ddoe.dc.gov/ddoe/cwp/view,a,1209,q,494854,ddoeNav_GID,1486,ddoeNav,[31375 31377].asp
State UST fund website: <ul style="list-style-type: none"> • n/a

FLORIDA
State brownfields website: <ul style="list-style-type: none"> • www.dep.state.fl.us/waste/categories/brownfields/default.htm
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.dep.state.fl.us/waste/categories/pss/default.htm
State UST fund website: <ul style="list-style-type: none"> • www.dep.state.fl.us/waste/categories/pcp/default.htm

GEORGIA
State brownfields website: <ul style="list-style-type: none"> • www.gaepd.org/Documents/brownfields.html
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.gaepd.org/Documents/index_land.html
State UST fund website: <ul style="list-style-type: none"> • www.gaepd.org/Documents/techguide_lpb.html#ust

GUAM
State brownfields website: <ul style="list-style-type: none"> • http://epa.quam.gov/
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • http://epa.quam.gov/
State UST fund website: <ul style="list-style-type: none"> • n/a

HAWAII
State brownfields website: <ul style="list-style-type: none"> • http://hawaii.gov/dbedt/gis/brownfields/
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • http://hawaii.gov/health/environmental/waste/ust/index.html
State UST fund website: <ul style="list-style-type: none"> • n/a

IDAHO
State brownfields website: <ul style="list-style-type: none"> • www.deq.idaho.gov/waste-mgmt-remediation/brownfields.aspx
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.deq.idaho.gov/waste-mgmt-remediation/storage-tanks/underground-storage-tanks.aspx • www.deq.idaho.gov/waste-mgmt-remediation/storage-tanks/leaking-underground-storage-tanks.aspx
State UST fund website: <ul style="list-style-type: none"> • www.idahopstf.org/

ILLINOIS
State brownfields website: <ul style="list-style-type: none"> • www.epa.state.il.us/land/brownfields/index.html
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.sfm.illinois.gov/commercial/ust/index.aspx
State UST fund website: <ul style="list-style-type: none"> • www.epa.state.il.us/land/lust/ust-fund.html

INDIANA
State brownfields website: <ul style="list-style-type: none"> • www.in.gov/ifa/brownfields/
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.in.gov/idem/4999.htm
State UST fund website: <ul style="list-style-type: none"> • www.in.gov/idem/5063.htm

IOWA
State brownfields website: <ul style="list-style-type: none"> • www.iowabrownfields.com/
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.iowadnr.gov/InsideDNR/RegulatoryLand/UndergroundStorageTanks.aspx • www.iowadnr.gov/InsideDNR/RegulatoryLand/UndergroundStorageTanks/LeakingUndergroundTanks.aspx
State UST fund website: <ul style="list-style-type: none"> • www.iowadnr.gov/InsideDNR/RegulatoryLand/USTFundBoard.aspx

KANSAS
State brownfields website: <ul style="list-style-type: none"> • www.kdheks.gov/remedial/index.html
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.kdheks.gov/tanks/
State UST fund website: <ul style="list-style-type: none"> • www.kdheks.gov/tanks/trust_fund/index.html

KENTUCKY
State brownfields website: <ul style="list-style-type: none"> • http://dca.ky.gov/brownfields/Pages/default.aspx
Are petroleum brownfields included in brownfields program? Yes - petroleum releases are not eligible for a Covenant Not To Sue (CNTS) if they fall under the UST program. The CNTS does not apply to petroleum storage tanks.
State UST/LUST program website: <ul style="list-style-type: none"> • http://waste.ky.gov/ust/Pages/default.aspx
State UST fund website: <ul style="list-style-type: none"> • n/a

LOUISIANA
State brownfields website: <ul style="list-style-type: none"> • www.deq.louisiana.gov/portal/tabid/269/Default.aspx
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.deq.louisiana.gov/portal/tabid/2659/Default.aspx
State UST fund website: <ul style="list-style-type: none"> • www.deq.louisiana.gov/portal/tabid/230/Default.aspx

MAINE
State brownfields website: <ul style="list-style-type: none"> • www.maine.gov/dep/rwm/brownfields/index.htm
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.maine.gov/dep/rwm/ust/index.htm
State UST fund website: <ul style="list-style-type: none"> • www.maine.gov/dep/rwm/groundwater/qwoilclean.htm

MARYLAND
State brownfields website: <ul style="list-style-type: none"> • www.mde.state.md.us/programs/Land/MarylandBrownfieldVCP/Pages/programs/landprograms/errp_brownfields/default.aspx
Are petroleum brownfields included in brownfields program? Depends - exclusive petroleum contamination is not covered under brownfields but is allowed with other contaminants.
State UST/LUST program website: <ul style="list-style-type: none"> • www.mde.maryland.gov/programs/land/oilcontrol/undergroundstorage/tanks/pages/programs/landprograms/oil_control/usthome/index.aspx
State UST fund website: <ul style="list-style-type: none"> • n/a

MASSACHUSETTS
State brownfields website: <ul style="list-style-type: none"> • www.mass.gov/dep/cleanup/brownfie.htm
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.mass.gov/dep/toxics/ust/
State UST fund website: <ul style="list-style-type: none"> • www.mass.gov/?pageID=dorterminal&L=4&LO=Home&L1=Businesses&L2=Programs+%26+S+ervices&L3=Underground+Storage+Tank+Program+%28UST%29&sid=Ador&b=terminalcontent&f=dor_ust_ppcf_overview&csid=Ador

MICHIGAN
State brownfields website: <ul style="list-style-type: none"> • www.michigan.gov/deq/0,1607,7-135-3311_4110---,00.html
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.michigan.gov/deq/0,1607,7-135-3311_4115_4238---,00.html
State UST fund website: <ul style="list-style-type: none"> • n/a

MINNESOTA
State brownfields website: <ul style="list-style-type: none"> • www.pca.state.mn.us/index.php/waste/waste-and-cleanup/cleanup-programs-and-topics/cleanup-programs/brownfields.html
Are petroleum brownfields included in brownfields program? Depends - if petroleum is the sole contaminant, the site is ineligible for VIC program.
State UST/LUST program website: <ul style="list-style-type: none"> • www.pca.state.mn.us/index.php/waste/waste-and-cleanup/waste-management/tank-compliance-and-assistance/underground-storage-tanks-ust/underground-storage-tank-ust-systems.html?menuid=&redirect=1
State UST fund website: <ul style="list-style-type: none"> • www.state.mn.us/portal/mn/jsp/content.do?id=-536881377&agency=Commerce

MISSISSIPPI
State brownfields website: <ul style="list-style-type: none"> • www.deq.state.ms.us/MDEQ.nsf/page/GARD_brownfields?OpenDocument
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.deq.state.ms.us/MDEQ.nsf/page/UST_PageHome?OpenDocument
State UST fund website: <ul style="list-style-type: none"> • www.deq.state.ms.us/MDEQ.nsf/page/UST_AssessRemediation?OpenDocument#Trust

MISSOURI
State brownfields website: <ul style="list-style-type: none"> • www.dnr.mo.gov/env/hwp/bvcp/hwpvcp.htm
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.dnr.mo.gov/env/hwp/tanks/tanks.htm
State UST fund website: <ul style="list-style-type: none"> • www.pstif.org/

MONTANA
State brownfields website: <ul style="list-style-type: none"> • http://deg.mt.gov/brownfields/default.mcpX
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • http://deg.mt.gov/UST/default.mcpX
State UST fund website: <ul style="list-style-type: none"> • http://deg.mt.gov/pet/default.mcpX

NEBRASKA
State brownfields website: <ul style="list-style-type: none"> • www.deg.state.ne.us/Superfun.nsf/Pages/Brown1
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.deg.state.ne.us/LUST-RA.nsf/Pages/PR-Fund
State UST fund website: <ul style="list-style-type: none"> • www.deg.state.ne.us/LUST-RA.nsf/Pages/LUST

NEVADA
State brownfields website: <ul style="list-style-type: none"> • http://ndep.nv.gov/bca/brownfld.htm
Are petroleum brownfields included in brownfields program? Depends - petroleum contamination is eligible if site does not qualify for reimbursement under the state's Petroleum Fund.
State UST/LUST program website: <ul style="list-style-type: none"> • http://ndep.nv.gov/bca/ust_home.htm
State UST fund website: <ul style="list-style-type: none"> • http://ndep.nv.gov/bca/fundhome.htm

NEW HAMPSHIRE
State brownfields website: <ul style="list-style-type: none"> • http://des.nh.gov/organization/divisions/waste/hwrb/sss/brownfields/index.htm
Are petroleum brownfields included in brownfields program? Depends - sites addressed under state's petroleum reimbursement fund are excluded.
State UST/LUST program website: <ul style="list-style-type: none"> • http://des.nh.gov/organization/divisions/waste/orcb/ocs/ustp/index.htm
State UST fund website: <ul style="list-style-type: none"> • http://des.nh.gov/organization/divisions/waste/orcb/fms/prfp/index.htm

NEW JERSEY
State brownfields website: <ul style="list-style-type: none"> • www.state.nj.us/dep/srp/brownfields/
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.state.nj.us/dep/srp/bust/bust.htm
State UST fund website: <ul style="list-style-type: none"> • www.nj.gov/dep/srp/finance/ustfund/

NEW MEXICO
State brownfields website: <ul style="list-style-type: none"> • www.nmenv.state.nm.us/gwb/NMED-GWOB-RemediationOversight.htm
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.nmenv.state.nm.us/ust/ustbtop.html
State UST fund website: <ul style="list-style-type: none"> • www.nmenv.state.nm.us/ust/caf.html

NEW YORK
State brownfields website: <ul style="list-style-type: none"> • www.dec.ny.gov/chemical/brownfields.html
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.dec.ny.gov/chemical/287.html
State UST fund website: <ul style="list-style-type: none"> • www.osc.state.ny.us/oilspill/index.htm

NORTH CAROLINA
State brownfields website: <ul style="list-style-type: none"> • http://portal.ncdenr.org/web/wm/bf
Are petroleum brownfields included in brownfields program? Depends - sites with exclusively petroleum hydrocarbon contamination from USTs are ineligible for brownfields program. State VCP addresses only non-petroleum contamination.
State UST/LUST program website: <ul style="list-style-type: none"> • http://portal.ncdenr.org/web/wm/ust
State UST fund website: <ul style="list-style-type: none"> • http://portal.ncdenr.org/web/wm/ust/tfb

NORTH DAKOTA
State brownfields website: <ul style="list-style-type: none"> • www.ndhealth.gov/WM/Brownfields/
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.ndhealth.gov/wm/UndergroundStorageTankProgram/
State UST fund website: <ul style="list-style-type: none"> • www.nd.gov/ndins/special/petroleum-tank-release-compensation-fund/

NORTHERN MARIANA ISLANDS
State brownfields website: <ul style="list-style-type: none"> • www.deq.gov.mp/section.aspx?seclD=8
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.deq.gov.mp/article.aspx?seclD=7&artID=45
State UST fund website: <ul style="list-style-type: none"> • n/a

OHIO
State brownfields website: <ul style="list-style-type: none"> • www.epa.ohio.gov/derr/SABR/sabr.aspx
Are petroleum brownfields included in brownfields program? Depends - sites with petroleum contamination that is not from USTs are allowed in VAP.
State UST/LUST program website: <ul style="list-style-type: none"> • www.com.ohio.gov/fire/bustmain.aspx
State UST fund website: <ul style="list-style-type: none"> • www.petroboard.com/

OKLAHOMA
State industrial/hazardous brownfields website: <ul style="list-style-type: none"> • www.deq.state.ok.us/lpdnew/brownfindex.html
State Oilfield (and Petroleum Storage Tank (PST)) brownfields website: <ul style="list-style-type: none"> • www.occeweb.com/og/brownfields.htm
Are petroleum brownfields included in brownfields program? Yes
State PST/LUST program website: <ul style="list-style-type: none"> • www.occeweb.com/ps/aboutpst1.html
State PST fund website: <ul style="list-style-type: none"> • www.occeweb.com/ps/aboutpst1.html

OREGON
State brownfields website: <ul style="list-style-type: none"> • www.deq.state.or.us/lq/cu/brownfields/
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.deq.state.or.us/lq/tanks/index.htm
State UST fund website: <ul style="list-style-type: none"> • n/a

PENNSYLVANIA
State brownfields website: <ul style="list-style-type: none"> • www.depweb.state.pa.us/portal/server.pt/community/ocrlqs/10305
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.portal.state.pa.us/portal/server.pt?open=514&objID=589769&mode=2
State UST fund website: <ul style="list-style-type: none"> • www.portal.state.pa.us/portal/server.pt/community/storage_tanks/14098/financial_assistance/589764

PUERTO RICO
State brownfields website: <ul style="list-style-type: none"> • www.gobierno.pr/JCA/Servicios/EmergenciasAmbientales/
Are petroleum brownfields included in brownfields program? n/a - list under development
State UST/LUST program website: <ul style="list-style-type: none"> • http://www2.pr.gov/Directorios/Pages/InfoAgencia.aspx?PRIFA=014
State UST fund website: <ul style="list-style-type: none"> • n/a

RHODE ISLAND
State brownfields website: <ul style="list-style-type: none"> • www.dem.ri.gov/brownfields/
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.dem.ri.gov/programs/benviron/waste/topictan.htm
State UST fund website: <ul style="list-style-type: none"> • www.dem.ri.gov/ustboard/index.htm

SOUTH CAROLINA
State brownfields website: <ul style="list-style-type: none"> • www.scdhec.gov/environment/lwm/HTML/brownfields.htm
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.scdhec.gov/environment/lwm/html/ust.htm
State UST fund website: <ul style="list-style-type: none"> • www.scdhec.gov/environment/lwm/html/ust.htm

SOUTH DAKOTA
State brownfields website: <ul style="list-style-type: none"> • http://denr.sd.gov/des/qw/Brownfields/Brownfields.aspx
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • http://denr.sd.gov/des/qw/tanks/TankSection.aspx
State UST fund website: <ul style="list-style-type: none"> • www.state.sd.us/drr2/req/prcf/index.htm

TENNESSEE
State brownfields website: <ul style="list-style-type: none"> • http://tennessee.gov/environment/ust/brownfields.shtml
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.tennessee.gov/environment/ust/
State UST fund website: <ul style="list-style-type: none"> • www.tennessee.gov/environment/ust/fund_reimburs.shtml

TEXAS
State industrial/hazardous/UST brownfields website: <ul style="list-style-type: none"> • www.tceq.state.tx.us/remediation/bsa/bsa.html
State Oilfield brownfields website: <ul style="list-style-type: none"> • www.rrc.state.tx.us/environmental/environsupport/brownfield/index.php
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.tceq.state.tx.us/nav/permits/pst_cert.html
State UST fund website: <ul style="list-style-type: none"> • www.tceq.state.tx.us/permitting/review/reimbursement/index.html
State Oilfield fund website: <ul style="list-style-type: none"> • www.rrc.state.tx.us/environmental/plugging/statemanagedcleanup.php

UTAH
State brownfields website: <ul style="list-style-type: none"> • www.environmentalresponse.utah.gov/
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.undergroundtanks.utah.gov/
State UST fund website: <ul style="list-style-type: none"> • www.undergroundtanks.utah.gov/pst_fund.htm

VERMONT
State brownfields website: <ul style="list-style-type: none"> • www.anr.state.vt.us/dec/wastediv/SMS/brownfields-home.htm
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.anr.state.vt.us/dec/wastediv/ust/home.htm
State UST fund website: <ul style="list-style-type: none"> • www.anr.state.vt.us/dec/wastediv/ust/home.htm

VIRGINIA
State brownfields website: <ul style="list-style-type: none"> • www.deq.state.va.us/brownfieldweb/
Are petroleum brownfields included in brownfields program? Depends - if not regulated under another program
State UST/LUST program website: <ul style="list-style-type: none"> • www.deq.state.va.us/tanks/
State UST fund website: <ul style="list-style-type: none"> • www.deq.state.va.us/tanks/reimbrs.html

VIRGIN ISLANDS
State brownfields website: <ul style="list-style-type: none"> • www.dpnr.gov.vi/dep/brownfields.htm
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.dpnr.gov.vi/dep/tanks.htm
State UST fund website: <ul style="list-style-type: none"> • n/a

WASHINGTON
State brownfields website: <ul style="list-style-type: none"> • www.ecy.wa.gov/programs/tcp/brownfields/brownfields_hp.html
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.ecy.wa.gov/programs/tcp/ust-lust/tanks.html
State UST fund website: <ul style="list-style-type: none"> • www.plia.wa.gov/ust/index.htm

WEST VIRGINIA
State brownfields website: <ul style="list-style-type: none"> • www.dep.wv.gov/dlr/oer/Pages/default.aspx
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.dep.wv.gov/WWE/ee/ust/Pages/default.aspx
State UST fund website: <ul style="list-style-type: none"> • n/a

WISCONSIN
State brownfields website: <ul style="list-style-type: none"> • http://dnr.wi.gov/org/aw/rr/
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • www.commerce.state.wi.us/ER/ER-BST-HomePage.html
State UST fund website: <ul style="list-style-type: none"> • http://commerce.wi.gov/ER/ER-PECFA-Home.html

WYOMING
State brownfields website: <ul style="list-style-type: none"> • http://deg.state.wy.us/volremedi/index.asp
Are petroleum brownfields included in brownfields program? Yes
State UST/LUST program website: <ul style="list-style-type: none"> • http://deg.state.wy.us/shwd/stp/
State UST fund website: <ul style="list-style-type: none"> • n/a

