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A Partnership for Quality Growth

Sponsored by the Coalition for Utah's Future, Envision Utah is a public/private partnership dedicated to encouraging dialogue and study on the effects of long-term growth in Utah. Envision Utah and its partners – with extensive input from over 18,000 residents – developed a publicly supported growth strategy that will preserve Utah's high quality of life, natural environment and economic vitality.

The Envision Utah partnership includes state and local government officials, business leaders, developers, conservationists, landowners, academics, religious leaders, and general citizens. This unique and diverse coalition works together to implement a common vision for the state as it faces the prospect of tremendous growth in the coming decades.

May 2006

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BROWNFIELD
REDEVELOPMENT
SOLUTIONS:

Recovering a Community's Hidden Assets



ENVISION UTAH

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A Partnership for Quality Growth

Envision Utah *gratefully thanks*
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The Church of Jesus Christ of Latter-day Saints Foundation
American Planning Association
Franklin Templeton Bank & Trust, F.S.B.
Friends of the Coalition for Utah's Future

Our thanks to the following for contributing to
THE BROWNFIELD REDEVELOPMENT SOLUTIONS TOOLBOX

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Blaine L. Carlton, Ballard Spahr Andrews & Ingersoll, LLP
LeAnn Diamond, Kleinfelder Engineering, Inc.
Dennis R. Downs, Utah Department of Environmental Quality
Robert Grow, O'Melveny & Myers LLP
Mike Hansen, Governor's Office of Planning & Budget
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Jim Holtkamp, Holland and Hart
Brad T. Johnson, Utah Department of Environmental Quality
Mike Keller, Van Cott, Bagley, Cornwall & McCarthy
Julie Kilgore, Wasatch Environmental
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David Meeks, Zions First National Bank
Kevin Murray, Chapman and Cutler LLP
Diane Nielsen, Utah Department of Environmental Quality
Hal Pos, Parsons Behle & Latimer
Christine Richman, Wikstrom Economic & Planning
Glen Roberts, U.R.S
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PREFACE

Guided by the principle that we should make efficient use of our existing resources and investments, Envision Utah sought to create a tool that streamlines the redevelopment of brownfield properties without changing existing regulatory requirements or cleanup standards. In spring 2005, Envision Utah staff interviewed various local professionals to find “wrinkles” within the process that could be ironed out with the assistance of a new method.

Following the interview process, Envision Utah convened a stakeholder meeting with professionals from relevant fields, including finance, development, insurance, municipal administration, environmental consulting, law, and geotechnical analysis. At this meeting, groups from each discipline outlined their general process and timeline for a standard brownfield redevelopment. Through this activity, participants quickly realized that no brownfield developments are ever really “standard.” Although each individual group knew its part, their understanding of the greater process, and the impact of their work on others, was limited.

Representatives from this stakeholder group sought to better inform all parties involved in the brownfield redevelopment process of their individual contribution and responsibilities. The working group met monthly from April 2005 to March 2006, distilling and refining the necessary information. Their efforts have resulted in this *Brownfield Redevelopment Solutions* toolbox.

We express our sincere gratitude for the time and energy donated to this effort. Each contributor brought considerable knowledge and experience to the project. A special thanks to all those who participated in the initial interviews, as well as all the working group’s members who put in countless hours authoring and editing the document.

While we hope you will find this information helpful, this resource does not constitute legal and technical advice. Regulations change and we encourage you to get appropriate legal advice as you consider brownfield redevelopment.

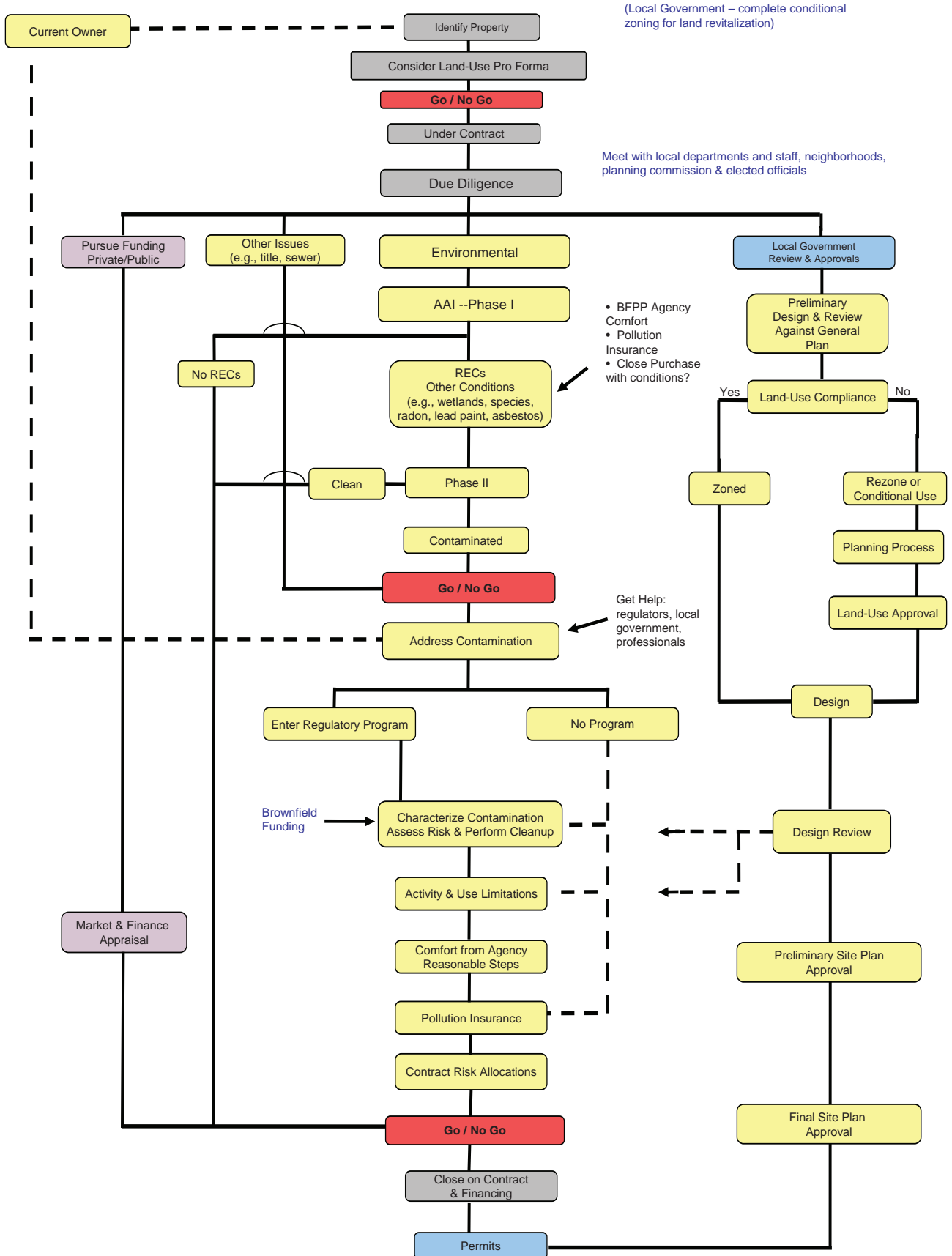
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Brownfield Redevelopment Solutions Process Outline



COMMON ACRONYMS ASSOCIATED WITH BROWNFIELD REDEVELOPMENT SITES

AAI:	All Appropriate Inquiry
AOC:	Administrative Order of Consent or Areas of Concern
ARARs:	Applicable or Relevant and Appropriate Requirements
AST	Above Ground Storage Tank
AULs:	Activity and Use Limitations
BFPP:	Bona Fide Prospective Purchaser
BRA:	Baseline Risk Assessment
BTEX:	Benzene, Toluene, Ethylbenzene, and Xylenes
CAP:	Corrective Action Plan
CCC:	Cleanup Cost Cap Program
CERCLA:	Comprehensive Environmental Response, Compensation and Liability Act
CCC:	Contaminants or Constituents of Concern
CPO:	Contiguous Property Owner Liability Protection
DNAPL:	Dense Non-Aqueous Phase Liquid
ECs:	Engineering Controls
EIA:	Environmental Indemnity Agreement
EPCs:	Exposure Point Concentrations
ERM:	Effects Range Median
ESA:	Environmental Site Assessment
FS:	Feasibility Study
HI:	Hazard Index
HQ:	Hazard Quotient
HRS:	Hazard Rank System
HSP:	Health and Safety Plan
IC:	Institutional and Engineering Control
ILD:	Innocent Landowner Defense
IRM:	Interim Remedial Measures
LLP:	Landowner Liability Protections
LNAPL:	Light Non-Aqueous Phase Liquid
LUST:	Leaking Underground Storage Tank
MCL:	Maximum Contaminant Level
MNA:	Monitored Natural Attenuation
MOA:	Memorandum of Agreement
NCP:	National Contingency Plan
NFA:	No Further Action or No Further Action Letter
NFRAP:	No Further Remedial Action Plan
NPL:	National Priorities List
NRD:	Natural Resource Damages

O&M:	Operations and Maintenance
P&T:	Pump and Treat
PA:	Preliminary Assessment
PAHs:	Polynuclear Aromatic Hydrocarbons
PCBs:	Polychlorinated Biphenyls
PLL:	Pollution Legal Liability Program
PPB:	Parts per Billion
PPM:	Parts per Million
PRA:	Probabilistic Risk Assessment
PRGs:	Preliminary Remediation Goals
PRP:	Potentially Responsible Party
QA/QC:	Quality Assurance/Quality Control
QAPP:	Quality Assurance Project Plan
RA:	Remedial Action or Risk Assessment
RAE:	Remedial Alternative Evaluation
RBCs:	Risk-Based Concentrations
RBCA:	Risk-Based Corrective Action
RCLs:	Recommended Cleanup Levels
RCRA:	Resource Conservation and Recovery Act
RD:	Remedial Design
RECS:	Recognized Environmental Conditions
RFC:	Reference Concentration
RFD:	Reference Dose
RG:	Remediation Goal
RI:	Remedial Investigation
RLV:	Residual Land Value
RP:	Responsible Party
SARA:	Superfund Amendments and Reauthorization Act
SCR:	Site Characterization Report
SMP:	Site Management Plan
SOP:	Standard Operating Procedures
SVE:	Soil Vapor Extraction
SVOCs:	Semi-Volatile Organic Compounds
TBA:	Targeted Brownfields Assessments
TIF:	Tax Increment Financing
TPH:	Total Petroleum Hydrocarbons
TRV:	Toxicity Reference Value
TSCA:	Toxic Substances Control Act
UDEQ:	Utah Department of Environmental Protection
U.S. EPA:	U.S. Environmental Protection Agency
UST	Underground Storage Tank
VCP:	Voluntary Cleanup Program
VOCs:	Volatile Organic Compounds



INTRODUCTION

This brownfield toolbox provides a useful compendium of tips, procedures, and other information to assist those who have a strong interest in brownfield redevelopments. Brownfields are generally defined as abandoned, idled, or underused industrial or commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination. Brownfields include areas such as an abandoned corner gas station, a former dry cleaning operation, or an old plating operation that, because of real or perceived pollution conditions, now sit idle and undeveloped because the cost of cleaning them up may have been prohibitively expensive in the past. Yet today, many of these same sites exist in prime real estate locations and can be bought at a cost that is substantially cheaper than undeveloped or uncontaminated land. Once remediated and redeveloped, these sites can be financially lucrative.

Real estate developers and investment groups are becoming increasingly aware of the many potential benefits of buying and developing brownfield properties; however, the tasks involved in turning an environmentally blighted property into productive and profitable real estate can be quite daunting if one does not know how to carefully navigate a myriad of issues.

Yet unlike years past, the methods of studying contaminated land have become much more precise, and the techniques used to remediate environmentally distressed properties have matured with more successful and predictable results. Today, government programs and assistance are also widely available to assist those interested in the redevelopment of a brownfield property, and there are many competent consultants, attorneys, and others who can assist throughout the process.

There is money to be made in those old blighted sites. Success is more likely to come to those who are willing to roll up their sleeves, understand the processes, and access the tools and experts who can assist you throughout the development phases.

This Toolbox simplifies and clarifies the redevelopment process. By using the Toolbox's tips and tools, the brownfield redevelopment process should become more streamlined and result in better profitability.

Herein you will be presented details and tips on identifying brownfield redevelopment properties (Section 1); land-use considerations by the buyer (Section 2); placing properties under contract (Section 3); the due diligence process (Section 4); managing environmental liabilities (Section 5); final approval on zoning and land-use (Section 6); and closing on the contract and financing (Section 7).



1. IDENTIFY PROPERTY

Before purchasing a brownfield redevelopment project, it is important to identify desired uses for the property. These uses largely drive the course of action and the degree to which federal or state environmental agencies will need to be involved. For example, the redevelopment of a severely contaminated site may only be economically viable if the eventual land-uses are considered along with the selected method of cleanup. Commercial and industrial land-uses typically do not require as much cleanup as residential land-use, and cleanup to a residential standard may be an unnecessary expenditure of resources. However, cleanup to a residential standard may provide the developer and property owner with more options for future land-use.

Property owners may have more flexibility in their remedial options if the contaminated property is not enrolled in formal regulatory programs. Yet even if flexibility in implementing a remediation program is desirable, it may still be prudent to obtain formal regulatory approvals.

Take the example of a site where the goal is to create a residential development. In this case, regulatory approval of the residual contaminant levels will enhance marketability of the project and protect the landowner against future toxic tort claims (see 4.1, page 9). On the other hand, commercial development of the same parcel may be financially more viable if the property's contaminant levels can remain than if it developed into residential properties that require a higher level of regulatory scrutiny. Furthermore, financial institutions may require that the developer obtain regulatory assurances that environmental conditions will not require future actions that would negatively affect the property value (see 4.4, page 12).

If the involvement of regulatory agencies is necessary, it is often helpful to approach these agencies early in the process (see 5.1.5, page __). Early consultation with the appropriate entities provides an opportunity to identify common goals and avoid costly potential hurdles and development delays. The regulatory agency may require additional environmental testing that will require remobilization of a contractor to gather the data. If the developer has designed a cleanup method unacceptable to the regulatory agency, it will be necessary to re-design the cleanup work. Through consultation, the parties can determine the best approach to work together on projects before resources have been committed to a certain course of action. Local municipalities, the Utah Department of Environmental Quality (UDEQ) and the United States Environmental Protection Agency (U.S. EPA) all recognize the desirability of brownfield redevelopment and have numerous tools at their disposal to facilitate the redevelopment of brownfield properties.

1.1 CURRENT OWNER MAY PROCEED TO REMEDIAL ACTION

If you are the current owner of a brownfield site, you may proceed to Section 5, Environmental Management (page 24).

2. BUYER CONSIDERS LAND-USE

A municipality's vision for the type of development it desires within its boundaries is outlined in its adopted General Plan. The General Plan identifies areas the community would like to see change through land reuse. These transitions can be from residential to retail, industrial to office, or any combination of proposed land-uses. The General Plan can identify isolated pockets of undeveloped land, known as infill sites, where new development is encouraged. Interestingly, along the Wasatch Front, former industrial and commercial areas that were once located outside or on the urban fringes are now centrally located and represent prime real estate for housing and commercial development.

In general, as a community develops its General Plan, it reviews potential reuse and infill areas with regard to the impact of changing land-uses on adjacent development, the potential to address environmental issues left in place from prior development, and broader community goals, such as providing opportunities for economic development or workforce housing.

Although the General Plan provides a comprehensive look at the community's desired future, not all issues and opportunities can be identified. General Plans are living documents that can be amended to reflect changing needs and opportunities in communities.

Entitlement Prospects

The first issue a buyer or landowner addresses when considering a parcel's possible land-uses is the prospect for getting land entitlements by a local government. A property owner (or real estate investor) should generally look at the uses delineated in the city's General Plan, although this is not always consistent with the pattern of recent planning decisions. For a brownfield site, choosing a land-use becomes particularly important because the use must control the site's contaminants and safeguard the environment, health, and welfare of future tenants and surrounding property owners.

Future Monetary Value

For a property purchaser (or an existing owner), the property's future monetary value is also a key consideration in determining a site's eventual land-use program. The property's future value (also known as the Residual Land Value), is the value of a fully developed project minus the costs of



construction, financing, marketing, and costs associated with the level of risk inherent in undertaking the development.

Many times, developers or real estate investors look for underutilized properties (not being used at their “highest and best use”). By changing the land’s use, the owner or developer captures the value created by the property’s transition to a land-use that maximizes its value.

Community Needs

The needs of the community is a third key consideration in selecting an eventual land-use, i.e., what type of development or proposed land-uses will help the city become a better place to live? This may not be the most profitable land-use; however, understanding how the government would like to develop the land can greatly facilitate what may, or may not, make financial and business sense.

After weighing entitlement prospects, future monetary value, and community needs, a “prospective eventual land-use” is considered. Through this process, a price should emerge that a buyer would be willing to pay for a parcel. If the transaction takes place, the brownfield redevelopment process continues. If the transaction cannot be negotiated on that parcel, a community will not see many applications for reuse in its district. In this case, the city may want to analyze whether or not its zoning or approval processes are obstacles that need to be reconsidered.

At this point in the redevelopment process, you must decide whether to go forward with your development or to pursue other options.

3. PROPERTY UNDER CONTRACT

Professional developers generally prefer to have a property under contract (i.e., a signed contract with the seller) prior to spending time and money developing plans for a property. If justified by possible returns, a developer may work to identify a property’s development potential. A developer may conduct some preliminary due diligence (i.e., an initial investigation into the broad range of issues that might affect the development’s viability).

Regardless, a developer likely wants to have a property under contract as soon as possible. Consulting with a good real estate or environmental attorney is critical in making sure any purchase offer contains the appropriate provisions for protecting all parties during the acquisition or disposition of a brownfield property.

4. BUYER DUE DILIGENCE

Prudent buyers and lenders conduct due diligence to investigate and learn critical information about a property before buying or making a loan secured by the property. In addition to investigating and assessing the property’s

environmental conditions and associated risks, buyers and lenders need to assess other characteristics of the property to determine if it will adequately serve their needs and future development plans. Such characteristics include appraised value, taxes, title to the property, existence of any impediments, zoning and allowable uses and densities, utilities, water rights, stability of soils, and earthquake potential. By identifying possible due diligence issues early in the process, buyers and lenders can prioritize critical issues that will make or break the deal and, thereby, minimize unnecessary and/or expensive due diligence later.

4.1 MARKET ANALYSIS

A market analysis is essential to determine a property's development feasibility. The property's "highest and best use" is ultimately determined by what the market will support. An understanding of both the regional and local market in which a property is located provides the insight necessary to determine the best land-use or mix of land-uses.

A market analysis should generally include: 1) market trends to estimate demand for residential, office, retail, and industrial real estate; 2) identifying and understanding supply and demand for specific land-uses within the regional market; 3) market capture and absorption analysis to examine the relationship among location, pricing, and market share; and 4) strategies to determine under-developed land-uses, create new markets, and develop strategies for a market-sustainable development plan.

The market analysis provides a good understanding of the property's best land-use or mix of land-uses and what absorption or market capture rates the market will support. With this information, a more accurate financial analysis of the property's development can be formulated with a decreased level of variability.

4.2 APPRAISAL

The appraisal determines the property's value under the current market conditions based on the land-use plans for the property. When choosing an appraiser for a property, it is often helpful to use a Member Appraisal Institute (M.A.I.)-certified appraiser. MAI-certified appraisers typically specialize in income producing properties and, thus, are generally more qualified than non-M.A.I. appraisers to handle non-traditional appraisals, such as brownfield redevelopment sites. The appraiser should use land-use plans and market analysis data to determine a property's market value. In determining the property's market value, the appraiser takes into account such possibilities as discounting for large, bulk land sale of the property and the development's potential final form. In general, an appraisal will be more accurate when the new or existing landowner provides comprehensive information regarding the projected land-use. If possible, providing an



appraiser an explicitly detailed written development plan will help in obtaining the property's most accurate appraisal.

4.3 ENVIRONMENTAL RISKS

Because brownfield redevelopment sites suffer from real or perceived environmental contamination, a potential development's success is highly dependent on successfully managing the site's environmental risks and uncertainties. Examples of a site's environmental risks include: Third-Party and Toxic Tort Liability Risks; Regulatory Risks; Timing Risks; and Financial Risks.

Third-Party and Toxic Tort Risks

Property sellers, buyers, owners, developers, and even contractors face various risks from soil or groundwater contamination that is located on, under, or originating from the property. Such risks may involve claims ranging from on- or off-site bodily injury, property damage from the migration of contaminants to off-site locations, and reduction of the adjacent sites' property value.

Regulatory Risks

Regulatory risks are of greatest concern to firms that wish to sell or redevelop their site and buyers involved in contaminated properties redevelopment. Changing regulatory standards could result in a government-mandated cleanup broader than originally approved or regulatory changes that impose more rigid cleanup standards to those sites once deemed "clean." Certain pesticides, for example, once deemed safe are now considered unsafe; thus, regulatory standards change as government agencies conduct more detailed environmental health studies.

Memoranda of Agreement (MOA), which are signed between the U.S. Environmental Protection Agency (U.S. EPA) and certain state regulatory agencies, have mitigated some of this risk of changing regulations. An MOA clarifies the relationship between the state and federal regulatory agencies and commits the federal agency to accept work that is performed under the state agency's auspices. A MOA can protect a property owner against future regulatory changes; however, most MOAs contain exceptions. Due to strict eligibility requirements, MOAs largely address sites unlikely to face federal CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) enforcement actions – even in the absence of the MOA.

Additional regulatory risks include waste generation and disposal activities performed during remedial actions and the discovery of pre-existing pollution conditions not previously identified. Most state Voluntary Cleanup Programs

(VCPs) provide some relief by limiting remedial liability of innocent landowners and purchasers, but they do not totally eliminate regulatory risks. Many states have voluntary cleanup programs that allow parties to partner with regulatory agencies and to pursue cleanup of contaminated properties under a voluntary agreement, as opposed to an enforcement action, that compels the party to perform the cleanup work.

The Utah Legislature adopted the VCP in 1997. All contaminated sites are eligible for the program except for certain treatment, storage or disposal sites; National Priorities List sites; and sites for which an administrative, state or federal enforcement action exists or is pending against the applicant for remediation of the site's contaminants. Those entered into a voluntary cleanup agreement are protected from Utah Department of Environmental Quality (UDEQ) enforcement actions regarding the contamination or release addressed by the agreement, so long as the applicant is in compliance with the Agreement's terms.

Timing Risks

Timing risks involve delays in development activities. Often, these are the result of the discovery and subsequent remediation of previously unknown contamination discovered during remedial or construction activities. Not only can the project's profitability be at risk, but also "soft" costs (such as the loan interest) may continue to be incurred during any such delays. Not all timing risks, however, are related to environmental conditions. For example, failure to pass zoning actions or secure permits for redevelopment activities may also cause costly delays. By meeting with the city and other involved agencies early in the process, these risks can be lessened and sometimes completely avoided.

Municipalities must understand the timing uncertainty that a change in zoning presents. Municipalities reduce timing risks for a developer by adopting realistic and flexible zoning upfront before a development is proposed. Further municipalities should adopt zoning that offers the land-use mix necessary for a brownfield redevelopment sites. Envision Utah has a pro-forma spreadsheet available for cities to use to understand how their existing regulations and the typical timeframe of approvals affect a potential redevelopment scenario. To learn more and download the spreadsheet, visit www.envisionutah.org/brownfields.

Financial Risks

Financial institutions are typically very cautious about providing financing on properties with known or suspected contamination. The contamination might affect the borrower's ability to finance the loan, leading to the loss of collateral value (which is used by lenders to assure that loans are fully secured), and increasing the possibility that the site will require additional funds for cleanup. Property owners and redevelopers face a range of financial



risks, including underestimating remediation costs, discovering additional contamination, and toxic tort liability.

Traditionally, the typical methods that property owners use to handle environmental risks include: 1) reducing the brownfield property's purchase price to offset anticipated environmental risks; 2) providing purchasers with contract guarantees; and 3) establishing a funding pool that can be used to pay for remedial activities via an escrow accounts, letters of credit, trust fund, or similar funding mechanisms. Contract guarantees may take the form of a Prospective Purchaser Agreement, or PPA, which is an agreement between the government and the contaminated site's prospective buyer that protects the prospective buyer from certain liabilities for contamination that is already on the site. A Purchase and Sale Agreement (PSA) and Environmental Indemnity Agreement (EIA) are executed legal agreements between a purchaser and seller of a property that define site environmental liabilities that will be transferred to, or will remain with, each of the parties involved.

These three methods, however, may lead to either long negotiations in establishing the contract indemnification terms or the need to maintain financial reserves that may be more than the estimated cost of remediation. Furthermore, contractual agreements may not be as ironclad as originally intended. Entering into one of these agreements with the incorrect parties, an insufficient number of parties, or with parties who do not possess enough assets, may undo any benefit the contractual agreement intended to provide.

To make matters worse, any of these agreements typically allow an entity to collect on them only after remediation has been paid for. They do not normally protect you from the need to defend against a claim or provide you with reimbursement before all costs have been incurred. Clearly, "buyer beware" should be exercised when entering into or relying upon contractual agreements.

One alternative that may help manage certain brownfield redevelopment site risks is for an owner to enter into an agreement with a specialized brownfield redevelopment and financing firm (several have emerged in recent years). Keep in mind that such businesses can provide the owner or purchaser of a brownfield redevelopment site with direct equity funding or financing that is given in exchange for a percentage of the property's ownership.

4.4 ENVIRONMENTAL - ALL APPROPRIATE INQUIRIES PHASE I

As the first part of a brownfield redevelopment project, the buyer/owner should conduct "all appropriate inquiry," an inquiry into the previous ownership and the property's uses to identify the presence (or likely presence) of hazardous substance or petroleum product releases. On November 1, 2005, the EPA published a federal regulation outlining standards and practices for conducting "All Appropriate Inquiries." The rule goes into effect on November 1, 2006. A Phase I Environmental Site Assessment (ESA)

conducted in accordance with the most recent version of the ASTM E1527 (currently 2005) standard is often used for this purpose. Conducting a Phase I ESA is voluntary, but is necessary for parties interested in landowner liability protections included in CERCLA, such as the Innocent Landowner Defense (protection for a land purchaser who did not know and had no reason to know of contamination at a site) or protection for the Bona Fide Prospective Purchaser (a land purchaser who buys a site with knowledge of contamination).

The Phase I ESA includes: 1) review of historical land-use records, government records of storage or release sites, and soil/groundwater information sources; 2) a site inspection; 3) interviews with owners, occupants, and operators of the property; and 4) a written report that lists all recognized environmental conditions identified or that specifically states that no recognized environmental conditions have been identified. Federal legislation requires that these activities be conducted by an environmental professional (as defined by the All Appropriate Inquiry rule under the 2002 Small Business Liability Relief and Revitalization Act). Many environmental consulting firms specialize in these types of site assessments.

The most commonly neglected requirements of the All Appropriate Inquiry process are the tasks that must be conducted by the buyer (or other party interested in landowner liability protections). For the All Appropriate Inquiry to be complete, the buyer must: 1) research land title records for environmental cleanup liens and land-use restrictions; 2) consider their own specialized knowledge, experience, or commonly known information that may be material to recognized environmental conditions; and 3) consider if the purchase price reasonably reflects the property's fair market value, and if not, consider if the lower purchase price may be due to the presence of contamination.

The Phase I ESA does NOT include collection of soil or groundwater samples. A records review for a Phase I ESA is limited to material that is publicly available, practically reviewable, and available within reasonable time and cost constraints. The Phase I ESA must be conducted prior to closing on the property.

4.4.1

If there are no recognized environmental concerns, then proceed to closing on the contract (Section 7, page 36).

If there are recognized environmental conditions or other concerns, proceed to Section 4.4.1 to conduct a Phase II.



4.4.1 CONDUCT PHASE II

A Phase II Environmental Site Assessment (ESA), which includes sampling and analysis, is typically conducted to determine whether hazardous substances or petroleum products have been disposed of or released at the site. A Phase II ESA does not typically include full characterization of a site's environmental condition. This is discussed further in Section 5. A Phase II ESA could be conducted before or after closing on the property.

If no contamination exists on the property, then proceed to Section 7, Closing on the Contract (page 36).

If contamination is found, then proceed to Section 5, Environmental Management (page 24).

4.4.3 AGENCY COMFORT

The U.S. EPA and the UDEQ are authorized to provide prospective purchasers of contaminated properties with written assurances that the buyers will not be subject to enforcement, cleanup cost recovery actions, or contribution claims, so long as the buyers satisfy certain conditions. The assurances can be made in the form of an agreement, order, or letter. These documents can be reviewed at www.epa.gov. A formal agreement or order may be more legally binding on agencies than a comfort letter. Many prospective purchasers seek agency assurances as part of their due diligence and environmental risk reduction strategy. Buyers also can use the agency assurances later in marketing the property and securing funding for redevelopment.

Written assurances for prospective purchasers are available under federal and Utah law. The U.S. EPA and/or the UDEQ will consider entering into a formal agreement or issuing a comfort letter to prospective purchasers. A regulatory agency's comfort letter typically states that a site complies with the agency's requirements, is clean enough for the intended use, and that no future enforcement action is expected, unless the site's conditions or uses change. The letter typically does not provide legally enforceable rights, such as relief from liability. The U.S. EPA has published documents available to guide parties interested in using such assurances, and a good environmental attorney or consultant can direct you in getting additional information on this subject.

If an administrative restriction affects the property, such as an Administrative Order, then government agencies have been willing to modify the order to provide the foregoing liability protection guarantees to prospective buyers. The assurances usually confirm that the prospective purchaser has completed an environmental site assessment of the property and identified the existing conditions affecting the property to the extent they are known. In exchange for compliance with the conditions, the agency will agree not to take action against the prospective purchaser.

Typical assurances state that the agency considers the buyer to be protected from liability so long as the buyer fulfills certain conditions for as long as he or she owns the property. The basic conditions include providing access for remediation activities, complying with activity and use limitations (e.g., prohibition of residential land-uses), responding to agency information requests, and cooperating with agencies and responsible parties. The more risky and uncertain conditions require the buyer to take reasonable steps to stop continuing releases of hazardous substances, prevent any possible future releases, and prevent or limit human, environmental or natural resource exposure to any previously released hazardous substance. Many buyers who wish to reduce their risk of noncompliance with these conditions (discussed in 4.6., page 16) should consider insurance or implement other third-party risk transfer mechanisms.

If the purchaser performs remediation as part of redeveloping the property and provides public benefits and amenities to the community, the agencies have been more willing to enter into formal agreements. The agencies are generally willing to provide a letter of comfort to prospective purchasers.

If you have agency comfort, proceed to Section Five, Environmental Management (page 24).

4.5 OTHER ISSUES TO CONSIDER

There may be environmental issues or conditions at a property outside the scope of the ASTM E1527 practice and the U.S. EPA All Appropriate Inquiry (AAI) regulations that need to be addressed. Some substances may be present on a property in quantities and under conditions that may lead to the property's contamination (or of nearby properties), but are not included in the specified definition of hazardous substances or petroleum products in the AAI regulations.

Buyers may want to evaluate the following considerations that **must be specifically requested if desired to be included in the AAI scope of work that an environmental professional prepares for a prospective purchaser:**

- Lead in drinking water;
- Wetlands;
- Regulatory compliance;
- Cultural and historic resources;
- Industrial hygiene;
- Human health and safety;
- Ecological resources;
- Endangered species;
- Indoor air quality; and
- Mold.



4.6 PRIVATE AND PUBLIC FUNDING OPTIONS

Failure to obtain funding often keeps a brownfield redevelopment project from moving forward. Funding a brownfield property requires creativity and the use of several resources. Private investment and public funding are the two primary sources of funding.

Private investment is often necessary, at least in the development's initial stages. Often, this is the only source of funding until the property is fully entitled for the land-use contemplated in the development plan. The owner/developer (or a potentially responsible party (PRP)) for the contaminated site generally must use his own money for the initial stages of remediation and/or entitlement.

Sometimes investors are also involved. Investors in brownfield properties usually look for a return on their investment of 20 to 35 percent, based on the project's risks. Investors also look to liquidate their investment in two to three years. Several options for obtaining private investment exist in the market place, including institutional funds that specialize in funding brownfield redevelopment sites. Often, environmental consultants, attorneys, and certain insurance specialists with good national connections can direct an owner to the appropriate contacts for this type of investor.

Traditional bank financing is generally not an effective source for funding prior to remediation or implementation of an agency-approved remedial action plan. Banks are hesitant to provide traditional funding due to the uncertainties associated with contaminated properties. In general, the further a project is along in the development process, the easier to involve traditional bank financing. If the project is small, however, or if the owner/developer has strong banking relationships, traditional bank funding can be obtained. Several national banks have departments that specifically address environmental properties. For this reason, it is often more effective to make contact with the appropriate national bank representatives and then have them contact the local bank branch. Here again, good environmental professionals can direct you to the best resources available. Additionally, some smaller banks and credit unions may be a good resource for borrowers. Regardless, it is important to identify those institutions that understand and have experience with "environmental risks."

Public funding can be divided into three main categories: 1) federal funding, 2) state/regional level funding, and 3) municipal funding. Although the local municipality may be the last to be considered (because they typically have little discretionary financial resources), having the municipality's support is the critical component to public funding. Most programs, even federal, require extensive municipal involvement to obtain the funds. For example, the municipality must apply for National Brownfield Grants.

Federal public funding comes in a variety of programs. A federal Brownfield Funding Guide identifying current federal programs can be downloaded at http://www.epa.gov/brownfields/partners/2005_fpg.pdf or obtained at Envision Utah.

Tax Increment Financing (TIF) is one form of local financing. TIF is a tool that local taxing entities can use to fund infrastructure and other public needs using the property's "future tax value." As the property is redeveloped, the property's assessed value grows, leading to an increase in the tax base. The local government uses this increase (or a portion thereof) to pay for bonds issued to install the public infrastructure or to provide incentives to development.

In addition to other programs outlined above, municipal assistance is sometimes available in the form of improvements to public infrastructure. If a municipality wishes to see development in a particular location where there also exists a public infrastructure need, the city may pay for public improvements that the project could not otherwise absorb. Improvements may include sewer, water, or roadway improvements. These are often costs a "greenfield" (i.e., a property that has not been previously developed) developer would normally absorb through impact fees.

There are many other funding options. Creativity and determination are vital in putting together a financing package to support a brownfield project. Financial consultants also exist to identify financing solutions.

4.7 LOCAL GOVERNMENT REVIEW AND APPLICATIONS

Local governments play a key role in the development of properties by providing a vision for what they want their community to become and by establishing the rules development must follow to accomplish the vision. The vision is established through adoption of a city's General Plan (described in section 1.2) and smaller Master Plans for individual neighborhoods or specialty areas. Zoning ordinances further define how the local government's vision can be accomplished.

4.7.1 PRELIMINARY REVIEWS

Developers should familiarize themselves with the city's General Plan, community Master Plans, and zoning ordinances prior to developing their preliminary plans. Preliminary plans should include enough detail so that the local government can understand the development concept, assess compliance with zoning and the General Plan (or applicable Master plan), begin to understand traffic impacts, and in general understand the development's impacts on the community. Local government representatives should study the plans and review with the developer areas of concern. If there are contamination issues, the developer should share this information with the local government at this early stage so the information can be included in the local government's initial response to the development.



4.7.2 PROPERTY APPROPRIATELY ZONED AND MASTER PLANNED

Assuming that the property is appropriately zoned for the developer's concept, local government should provide the developer with an outline of the necessary steps to be taken to obtain a building permit, including: design guidelines, if any, required by the community; building permit fees; local government contacts that need to be involved in the permitting process (i.e., fire and police departments, public utilities, and transportation); and timeframes for the review of plans and other processes.

To address the unique complications typically associated with a brownfield project, communities should consider establishing Design Review Teams (DRT). DRTs encapsulate in one coordinated group all of the city divisions that will be involved in the permitting process. Ideally, these teams meet on a regular basis to discuss, review, and provide information to developers. If a community has not established a DRT process, the developer may ask that a committee be formed for their particular project.

4.7.3 PROPERTY IS NOT APPROPRIATELY ZONED AND MASTER PLANNED

If, as part of the preliminary review, it is discovered that the property is not zoned and/or mastered planned for the developer's proposed use, the permitting process is substantially more complicated. Please note that there is an important difference between proposing a development that does not comply with zoning, compared to one that does not comply with the General Plan. While both processes typically require an application process, community involvement, approval by the local planning commission and the local elected officials, the approval procedure is more extensive and much less certain when the project does not comply with the city-wide General Plan or the community Master Plan. Developers should familiarize themselves with both the vision and the zoning regulations to understand how to design the project so that it will likely be approved.

General Plans and Master Plans - Cities typically develop General Plans to designate specific areas for residential, commercial, open space, and industrial uses. When a developer proposes a use that does not conform to the Master Plan, he or she may be faced not just with technical zoning issues but also with community opposition. Community groups can be very vocal with the local elected officials and may use the media to make their case. If possible, developers should become involved in the Master Plan development process because input is taken from property owners during the drafting process. It is much easier to ensure that the Master Plan process considers the developer's concept than to amend the Master Plan after it is adopted. If a Master Plan amendment is required to accommodate the proposed development, the developer should present a clear vision of the proposed development to the community, planning commission, and elected officials. The developer should

also be prepared to modify the development concept as he or she negotiates the Master Plan amendment.

Zoning Changes - Sometimes a development proposal is consistent with the Master Plan, but not with the current zoning. The zoning change process typically requires the developer to appear, first, before the planning commission (the body that makes a recommendation to the elected officials) and, second, to the city council, who may then amend the zoning ordinance. Where possible, cities should avoid having zoning in redevelopment areas that is inconsistent with the Master Plan. This inconsistency presents to the developer an additional burden of approval time. The uncertainty associated with the approval can significantly increase the financial risk faced by the developer. Because a developer typically addresses a multitude of factors in a brownfield redevelopment project, cities should remove unnecessary barriers, such as inconsistent zoning, to encourage a brownfield reuse.

Conditional Use Permits - In some cases, minor changes to requirements, such as minimum yard setbacks or parking requirements, may be addressed with a conditional use permit (CUP) process. A CUP addresses proposed land-uses that are fundamentally consistent with the city's vision and underlying zoning, but, because of their added complexity, must meet certain specific standards before approval is granted. For example, some cities require residential development in a mixed-use commercial zone to follow a CUP procedure to ensure that issues such as commercial noise, lighting, and odors do not negatively affect the quality of life for future residents.

Unfortunately, in some cases city officials have used the discretionary power of a conditional use permitting process as a means to de facto deny a use that they do not think is appropriate. Cities should draft and follow objective approval criteria for a CUP. Failure to do so, over time, sends a message to brownfield redevelopers that they should look to other cities for development opportunities.

Land-Use Approval - After what can be a several week or month-long process, the elected officials will rule on the proposed land-use and zoning changes. Once these land-use decisions are officially made, the developer will decide whether to proceed with the development. Sometimes outside factors, such as environmental contamination or some other unforeseen event, requires reconsideration of the Master Plan and/or zoning after the initial approval. When the developer decides to proceed with the development, given the Master Plan and zoning requirements, he or she should ensure the design meets at least the minimum requirements of the Master Plan and zoning or face the need to go through the Master Plan or zoning-change process again.



4.7.4 DESIGN

During the design process, the developer should stay in touch with the local government representatives and discuss changes to the preliminary design. Communication between the developer and the local government is essential to assure a smooth design review process for the issuance of a building permit. The brownfield developer is responsible to keep local government informed of changes to the preliminary design, which may affect the compliance with zoning and the Master Plan.

The developer's design team should participate in the preliminary review process. The developer ensures that the design team is aware of local government requirements and rules for issuance of a building permit. The design team has a responsibility to find the balance between the developer's financial and tenant constraints and the municipality's zoning requirements.

Local government should also approach the relationship with the developer as a partnership to achieve a community good, the reuse of a brownfield property. The local government should help developers efficiently navigate the city review processes. The city also needs to understand that, as the design is finalized, changes may be made to address the tenant's needs, contamination issues, and financial constraints. If good communication is maintained, local government can help the developer find solutions within the existing zoning requirements to facilitate the development's design.

4.7.5 ACTIVITY AND USE LIMITATIONS

During the course of due diligence, information may be discovered about the site that requires land-use restrictions to be placed on the property. If there is a danger to public safety or health, local governments may require that these use restrictions be recorded as a deed restriction prior to issuing a building permit. These activity and use limitations are discussed more completely in Section 6, page 35.

4.7.6 PERMITS

Upon completion of design, the developer will submit multiple copies of the final construction drawings for review by the local government to obtain a building permit. This final review and permitting process can take days or weeks, depending upon the project's complexity, the submittal's completeness, and the level of collaboration between the developer and the local government during the design process.

Once you have obtained your permit, proceed to Section 6, Final Approval on Zoning or Land-Use.

4.8 MANAGING RISKS AND UNCERTAINTIES

4.8.1 CONTRACT RISK ALLOCATIONS

Participants in real estate transactions typically encounter provisions in the contracts and loan documents allocating the risk of known and unknown environmental and other liabilities. The basic question is which parties will bear these risks. Various contractual provisions are used (typically in connection with one another) to allocate or shift risks for environmental conditions and liabilities. Some typical provisions include:

- *Representations and Warranties*, where one party represents to another party that information about the property's environmental condition and possible liabilities are true. Representations and warranties provide a contractual mechanism for disclosure of important information and provide a legal basis for claims of "breach of contract" or warranty or misrepresentation if the information is untrue. Important considerations in negotiating such provisions are whether the representations and warranties will be absolute or limited to actual or constructive knowledge of the party making them, whether they will be limited by a defined standard of materiality, and whether they will survive the transaction.
- *Disclaimers*, by which one party (typically the seller) tries to avoid any responsibility for the property's environmental condition and any associated environmental liabilities. A commonly used provision is an "as is" clause which clarifies that the buyer purchases the property in its current state, including any negative conditions on the site. To be an effective environmental disclaimer, the language should be explicitly clear that the seller takes no stand with regard to the property's environmental conditions and associated liabilities. Beyond use as a mere disclaimer to avoid an action for misrepresentation or implied warranty, an "as is" clause (under standard legal interpretations) offers a lot of protection against claims by the buyer or subsequent purchasers. An indemnity, release, or assumption provision would also be required to shift liability from one party to another.
- *Release or Assumption (of Liability) Provisions* are defined by one party agreeing to release the other party from environmental liability or assuming environmental liability themselves.
- *Indemnification, Hold Harmless and Defend Clauses* through which one party agrees to secure the other party from liability and to defend the other party in case of any losses or costs from environmental conditions and liabilities. Like insurance policies, these clauses are only as effective as the clarity and scope of their language and the financial ability of the party agreeing to provide the indemnification.
- *Remediation Agreements* where one party agrees to remediate all known or suspected contamination. These agreements may include reserving all



or a portion of the purchase price to make sure that enough money is available for the remediation.

- **Insurance Provisions** obligate one party to obtain particular types of environmental insurance to cover any unknown environmental conditions and liabilities or to cover cost overruns in the remediation of known conditions.

It is recommended that parties hire an experienced environmental law attorney or firm which can provide guidance through the contract process and identify the most appropriate legal mechanisms to use.

4.8.2 RISK INSURANCE

Today, environmental insurance essentially comes in two basic forms: 1) insurance that addresses “known” pollution conditions (e.g., Cleanup Cost Cap coverage – see page **XX**), and 2) insurance that addresses “unknown” pollution conditions (e.g., Pollution Legal Liability coverage – see page **XX**). There are many variations to these two basic environmental insurance forms. All of them intend to address specific environmental exposures to either the buyer or seller (or both) of a brownfield redevelopment site.

While environmental insurance is not a universal remedy for addressing the risks of a brownfield redevelopment project, insurance has become a valuable tool that eliminates enough uncertainty to encourage many brownfield redevelopment projects to proceed. In fact, a well-written insurance program removes many environmental liabilities from the transaction equation, making it very useful to facilitate the property transaction – particularly during the negotiation phase of the sale or purchase of the brownfield site.

Carefully crafted insurance programs can be used to: 1) limit site and third-party environmental exposures; 2) stabilize future environmental expenses; 3) maximize the property’s value; 4) reiterate contractual indemnity language; 5) increase overall debt capacity by the acquiring entity; 6) improve financing opportunities; 7) address or eliminate many regulatory concerns; and 8) *potentially* accelerate certain tax benefits.

The following environmental insurance programs are particularly beneficial to parties involved in brownfield purchases, sales, ownership, reuse, and redevelopment:

Pollution Legal Liability Program: Pollution Legal Liability (PLL) insurance is designed to protect the insured from the consequences brought about by the discovery of a site’s previously unknown environmental liabilities. PLL coverage can be an extremely powerful insurance program that is capable of transferring risk particularly in the following ways (the effective site coverage depends on how the program is specifically tailored):

- Provides financial assurance protection and may be used in place of, or in support of, environmental indemnities or similar contract language.

- Protects against the financial impact of remediation costs for unknown pollution conditions.
- Provides protection against the cost of additional remediation due to regulatory “re-openers” (see page **XX**).
- Protects against third-party mass tort and toxic tort bodily injury suits alleging exposure to pollutants, including costs of defense (see page **XX**).
- Protects against third-party property damage, diminution of property value, and natural resource damages.
- Protects against losses of income and extra expenses associated with pollution conditions.
- Protects against business interruption in the event of the discovery or remediation of pollution conditions.

Cleanup Cost Cap Program: A Cleanup Cost Cap (CCC) insurance program (also referred to as Remediation Stop Loss) is designed to protect responsible parties from cost overruns of known environmental liabilities associated with a regulatory-driven environmental remediation project. CCC coverage limits the financial exposure related to a specific cleanup.

If a remediation is necessary and limiting exposure is desirable, consider CCC insurance. A CCC policy “caps” the remediation’s cost when the actual project costs exceed the original estimated budget by either a predefined percentage or a set amount.

A CCC policy typically responds to the following scenarios:

- There are cleanup cost overruns at, adjacent to, or emanating from the scheduled site location.
- The oversight agency imposes regulatory changes on the Remedial Action Plan.
- A third party incurs certain liabilities.

Structured Risk Transfer (i.e., “Finite”) Program: The Structured Risk Transfer insurance program is one of the more powerful environmental insurance options available. By combining traditional and alternative risk financing components, Structured Risk Transfer coverage shifts the financial responsibilities associated with either known or unknown environmental liabilities to an insurance carrier which, in turn, pays all applicable associated costs, as defined in the policy, on behalf of the insured.

A properly constructed Structured Risk Transfer insurance program can realize three major benefits: stabilizing cash flow, providing greater financial flexibility, and reducing record-keeping and accounting tasks.

Lender Liability Insurance Program: The Lender Liability insurance program helps facilitate the commercial loan process. The lender’s policies may allow a financial institution to lend on a property that was previously



considered as having too many undesirable environmental risks. These policies are designed to protect commercial real estate lenders from financial loss due to default and the existence of a contaminated condition at regulated levels. If a default occurs, the policy typically covers payment of the loan's remaining unpaid balance and any accrued interest from the point of default to payment of the claim, or the cost of remediation that led to the loan default, whichever is less.

5. ENVIRONMENTAL MANAGEMENT

This section outlines in 5.1 the regulatory programs that govern management of contamination and risk, and 5.2 outlines the process to further characterize the type and extent of contamination and the process to address cleanup of the site.

5.1 REGULATORY PROGRAMS

5.1.1 NATIONAL PRIORITY LIST

The National Priority List (NPL) identifies the country's most seriously contaminated sites. Before being added to this list, sites undergo rigorous scrutiny and a demanding regulatory process. Sites on the list are subject to the provisions of CERCLA, and the investigation and remediation of these sites must comply with the requirements of CERCLA. The U.S. EPA administers this program (with substantial involvement from the state environmental programs and the local communities). For additional information about CERCLA, contact the U.S. EPA, the Utah Division of Environmental Response and Remediation, or an environmental attorney.

5.1.2 NON-NATIONAL PRIORITY LIST PROGRAMS

Brief summaries of the environmental programs that most commonly affect the development of properties in Utah follow below. These descriptions provide only basic information. Contact the respective Lead Agency to obtain additional information about the regulatory requirements.

Asbestos (Toxic Substances Control Act (TSCA)) - Asbestos is a naturally occurring mineral that is used in some building materials and industrial products. The material was previously used much more extensively than it is today. Older buildings may have insulation and other materials that contain asbestos. Asbestos Containing Materials (ACM) must be handled in compliance with existing regulatory requirements.

Lead Agency: Utah Division of Air Quality
www.airquality.utah.gov/HAPs/ASBESTOS/index.htm.

Brownfields - This program provides resources to assist in developing properties where redevelopment or reuse is complicated by the presence or potential presence of contamination. Grants and low interest loans are available for eligible entities to investigate and remediate these properties. The Utah Division of Environmental Response and Remediation also provides support to investigate a site's contaminated condition.

Lead Agency: Utah Division of Environmental Response and Remediation
www.superfund.utah.gov/vcp.htm

CERCLA (Superfund) - This program addresses the remediation of hazardous substances from abandoned or uncontrolled sites. The definition of hazardous substances includes a very broad range of contaminants that could be subject to the program's requirements. The CERCLA database includes previously evaluated sites. (www.epa.gov/superfund/sites/query/basic.htm)

A small number of these sites qualify for the National Priorities List (NPL) and warrant intense investigation and thorough cleanup (see 5.2.1, page 24).

Lead Agency: U.S. EPA
States also participate in a support capacity. The Division of Environmental Response and Remediation is the program's lead state agency.
www.superfund.utah.gov
www.epa.gov/superfund

Lead-Based Paint - Prior to 1978, lead was a common ingredient of residential housing paint. This program mitigates human exposure to lead in paint. A number of regulatory requirements must be satisfied when properties that may contain lead-based paint are renovated, sold, or rented.

Lead Agency: The Utah Division of Air Quality
www.airquality.utah.gov/HAPs/lead/index.htm.



Polychlorinated Biphenyls (TSCA) - Polychlorinated Biphenyls (PCBs) are synthetic organic chemicals used in numerous industrial applications, including electrical insulation, heat transfer systems, hydraulics, paints, rubber products, pigments, electrical transformers, dyes and many others. The United States banned production of PCBs in 1977. A national program ensures that remaining PCBs are properly handled and disposed. The U.S. EPA administers a non-delegated federal disposal program.

Lead Agency: U.S. EPA
The Utah Division of Solid and Hazardous Waste provides information about the disposal of PCBs.
www.epa.gov/opptintr/pcb
www.hazardouswaste.utah.gov

RADON (TSCA) - Radon is a gaseous radioactive substance derived from the radioactive decay of radium. It occurs naturally and can accumulate in buildings, potentially causing adverse health effects to the building's occupants. The radon program provides the public with information and advice regarding radon. The U.S. EPA established guidelines for radon exposure. There are no regulatory requirements and the program is voluntary.

Lead Agency: Utah Division of Radiation Control
www.radiationcontrol.utah.gov/RADON.htm

Resource Conservation and Recovery Act (RCRA) - This program regulates the handling and disposal of hazardous wastes. Hazardous waste is defined by regulation and includes a broad range of waste products associated with various industrial processes. Facilities that manage hazardous waste are subject to the RCRA regulations and remediation of contamination at these facilities must meet regulatory requirements.

Lead Agency: Utah Division of Solid and Hazardous Waste
www.hazardouswaste.utah.gov/

Underground Storage Tanks - This program regulates the storage of hazardous substances and petroleum in underground tanks, and the majority of these are associated with gasoline fueling stations. Removal of these tanks and remediation of any associated contamination is subject to the program's regulatory requirements.

Lead Agency: Utah Division of Environmental Response and Remediation.
www.undergroundtanks.utah.gov/

Utah Voluntary Cleanup Program - In some circumstances developers, property owners or municipalities need oversight of an environmental cleanup by an environmental regulatory agency, even though the site is not subject to a specific regulatory program. In most instances, this oversight is necessary to complete a property transaction or to secure funding for a project. The Utah Department of Environmental Quality administers two programs for participants to voluntarily remediate contamination: the Division of Environmental Response and Remediation and the Division of Solid and Hazardous Waste.

The applicant selects the appropriate program based on his or her individual needs and circumstances. The two divisions coordinate closely. Potential applicants should arrange a pre-application meeting with both agencies to discuss the project and to identify the appropriate program for the circumstances.

Lead Agency: Utah Division of Environmental Response and Remediation and the Utah Division of Solid and Hazardous Waste.

www.superfund.utah.gov/vcp.htm

5.1.3 NO PROGRAM

Although the remediation of contaminated sites under agency oversight is often the best course of action, there are instances when a formal program may not be necessary. In situations where remediation would be relatively simple and straightforward, where the property owner has significant experience with the contamination's form, and has sufficient resources to accomplish the job effectively, the most efficient course of action may be to address the contamination "out of program."

Generally, these types of cleanups progress much faster and are less expensive than those conducted under regulatory control – at least in the short term. Obviously, the drawback to this approach is that it does not meet regulatory procedures and cleanup standards. Thus, there is always the possibility that the response action could be considered by the environmental agencies as an insufficient response or even an aggravation of the problem. This approach also may preclude the party performing the cleanup from compelling other parties that may be responsible for the contamination to contribute to the cleanup costs.

Statutory contribution rights under CERCLA and state law are also not normally available under this type of program; consequently, out of program cleanups are generally not advisable when the property owner hopes to recover remediation costs from other potentially responsible parties. Nevertheless, so long as these potential consequences are considered beforehand, out of program cleanups sometimes provide the best approach.



5.2 CHARACTERIZATION OF CONTAMINATION AND CLEANUP

Sites that have known environmental contamination typically require some form of further evaluation and possibly remediation. The general steps in this process include site characterization (or investigation) of contamination, assessment of risk associated with the contamination (risk assessment), remedial engineering of the cleanup, and the actual site remediation.

The most efficient approach to performing these tasks begins with an early focus on the risks posed by the site's contamination and options available to clean up the contamination and eliminate the risk. The broader scope of site characterization and remediation is described below and is likely to include the following activities:

1. Characterization of Contamination
2. Human Health Risk Assessment
3. Ecological Risk Assessment
4. Remedial Alternative Evaluation
5. Engineering Design
6. Treatability and Pilot Studies
7. Remedial Construction

5.2.1 CHARACTERIZATION OF CONTAMINATION

Site investigation involves preparation of a work plan, field sampling, laboratory analysis, and development of a findings report that documents the investigation results. A qualified environmental consultant typically performs this work (in concert with the site owner (or buyer/developer) and appropriate regulatory agencies). The goal is to prepare a work plan that is acceptable and defensible to the regulatory agencies, while focusing the data collection process on information specifically needed to assess the site risks or develop the remediation. The work plan identifies the purpose for each sample location, analytical procedure, and investigation methods. This ensures that all parties have a consistent understanding of the environmental sampling to be performed. The work plan generally limits the addition of unnecessary investigation activities.

The work plan and its implementation should rely on industry-standard sampling techniques and equipment to provide consistent and accurate data. The selection of environmental sampling techniques and locations are primarily influenced by the location of potential contaminant sources, the contamination types, the soil's attributes, groundwater depth, direction and rate of groundwater flow, and other subsurface geology. The primary goal is to characterize the presence, nature, and extent of contaminants at a particular location. Proper protocols during sample gathering, transport, and analysis must be observed to ensure the validity of the results. The selected consultant should use an approved system of standard operating procedures for the collection of environmental samples.

5.2.2 HUMAN HEALTH RISK ASSESSMENTS

Once the contamination is better understood through step 5.2.1, the potential risk the contamination poses to human health needs to be assessed. Human-health risk assessments may consist of a complete site-specific risk assessment performed in accordance with the state regulations (e.g., Utah R315-101) and the *U.S. EPA's Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual Supplemental Guidance*. A site-specific risk assessment is outlined below.

Alternatively, the risk assessment process could be limited to evaluating existing data about the site's contamination and comparing these data to available risk-based regulatory cleanup standards or screening criteria. The appropriate approach depends on site conditions and whether remediation work is to be performed under a particular state or federal regulatory program (see 5.2).

If a site-specific risk assessment is required, the following general steps are followed:

1. **Identify Chemicals of Concern** - Include chemical concentrations, availability, toxicity, frequency of detection, and environmental persistence, as observed from previous investigations.
2. **Assess Exposure** - Identify potentially exposed populations and realistic exposure scenarios under both "residential" and "actual land-use or potential land-use" conditions. Assessing the routes contamination has traveled or may travel is part of this step. (This includes the transport processes that influence the environmental behavior of the chemicals of concern.) Conceptual site models represent probable source areas, contaminant migration pathways, likely exposure points, and exposure routes.
3. **Assess Toxicity** - Review the possible toxic effects from exposure to each chemical of concern. Gather information about each chemical's physical and chemical properties, appropriate regulations and standards, processes that affect the chemical's behavior and persistence in the environment, its ecotoxicology, human toxicology, and any other unique considerations. Attention should be given to both the chemical's acute and chronic toxicity, including the site's carcinogenic effects (cancer causing) and genotoxic effects (causing changes to human DNA), if applicable.
4. **Risk Characterization** - The results of the exposure assessment and toxicity assessment are integrated to calculate the site's carcinogenic risk levels. In the focused risk assessment, existing site concentrations are compared with conservatively calculated, risk-based concentrations deemed acceptable by the regulatory agencies (i.e., U.S. EPA and Utah DEQ).



Depending on the contamination's level, the applicable regulatory agency may require a "no further action" letter, institutional controls, or a Corrective Action Plan (CAP) based on the results of your environmental testing.

5.2.3 ECOLOGICAL RISK ASSESSMENTS

An ecological risk assessment estimates the effect of chemicals, alteration of habitats, or introduction of new species, as well as other variables that may pose a threat to the non-human environment. An ecological risk assessment typically evaluates the actual or potentially negative effects of hazardous chemicals or wastes on an ecosystem. An ecological risk assessment also identifies:

- sensitive environments and species in water, land, and combination habitats such as wetlands;
- specific ecological exposure pathways and contaminant exposure concentrations in these habitats;
- appropriate exposure endpoints for ecological and toxicity studies; and
- probabilities of negative effects to individuals and populations in the environment.

Together with the human health risk assessment, the ecological risk assessment provides a framework to assist risk management and remedial decisions about a contaminated site.

A specific goal of the ecological risk assessment is to identify site-specific contaminant levels that, if remediated to specific chemical concentrations, will be protective of human health and the environment.

5.2.4 REMEDIAL ALTERNATIVE EVALUATIONS

As soon as possible during the remedial design process, the amount(s) of contamination and/or the magnitude of groundwater contamination should be estimated. This information is used to perform an engineering feasibility study, which is an evaluation of possible remedial alternatives that might be used to remediate a site. The level of the alternatives evaluation depends on the location and extent of the contamination's impacts and possible cost for remediation. A small impact (e.g., relatively low concentrations of petroleum-contaminated soil in a limited area) may not require a complete review of alternatives, whereas a complex contaminated site may require a full-scale CERCLA-type feasibility study. The National Contingency Plan (NCP) requires a comparison of remediation alternatives if a claim for cost recovery is being considered against a previous site owner or insurance company.

The data collected during the site investigation and risk assessment processes are used to develop the site's cleanup goals (remedial action objectives). These

goals represent the site concerns that should be addressed through remedial actions.

The remedial action objectives provide a basis for developing and evaluating possible remediation alternatives. A range of alternatives specific for the site is typically considered, with the most practical alternative generally being in the middle of the range. The potential alternatives are developed through a comparison of practical remedial technologies, and selection of those most relevant to the site for compilation into alternatives representing different levels of remediation effectiveness, ability to be implemented, and cost.

The feasibility study presents a written description of each alternative, followed by an assessment of each alternative's estimated effectiveness, ability to be implemented (i.e., technical and administrative feasibility), and estimated cost. The remediation alternatives are then compared and screened using these three criteria (or the broader nine criteria for full-scale CERCLA studies) to help site owners or developers make an informed decision as to which remedy to implement and the likely costs associated with each alternative. Through this evaluation, data gaps can be identified that will require additional assessment during later remedial design activities.

5.2.5 ENGINEERING DESIGN SERVICES

Following the selection of a preferred remediation alternative, the owner (or developer) and a consultant outline a remedial design strategy and implementation schedule for remedial action. The design process typically consists of at least a two-step process: preliminary design and final design. Intermediate steps may also be included in the design schedule.

A Preliminary Design Report (PDR) presents the details of the selected remedy and the basis for the design. This report is provided for review and approval to the owner or developer and appropriate regulatory agencies. The preliminary design provides specific details on the remedy's costs, schedule, assessment data gaps, and remediation confidence level. The preliminary design identifies remedy assumptions that were used to develop the PDR and helps the owner (or developer) decide whether additional site characterization is needed to fill data gaps. During the design process, a balance is eventually reached where the developed confidence levels are sufficient to remediate the site without collecting additional site data. The preliminary design aims to achieve an appropriate balance between a desired high confidence level and desired low remediation costs.

In situations involving regulatory approvals, the design should address the regulatory agencies' comments. The owner (or developer) is also encouraged to meet with city officials during this time to ensure the remedial design's compatibility with the city's regulations.

Upon approval of the preliminary design and when an appropriate level of confidence has been achieved to proceed with the final design, the



owner/developer and his consultant develop a design package suitable for bidding and construction purposes. The package's components typically include the following:

- **Preliminary Drawings** showing the locations, dimensions, contours, cross sections, details, process flow diagrams, etc., of the proposed remedy;
- **Final Drawings** with details regarding concrete reinforcing, electrical and lighting connections, plumbing, building and roof details, and additional features, as appropriate;
- **Technical Specifications** to describe the work's general requirements, materials, necessary equipment, and the execution procedures; and
- **Engineer's Estimate of the Construction Cost** which is updated during the design process.

Depending on the circumstances and owner (or developer) preferences, the plans and specifications can be highly detailed or more general. Additional decision-making will take place in the field.

A licensed Professional Engineer with experience in environmental projects should direct this work. The Professional Engineer signs and stamps the drawings prior to distribution to prospective contractors for bidding and construction purposes.

5.2.6 TREATABILITY AND PILOT STUDIES

As part of either the Feasibility Study or during the Remedial Design processes, treatability or pilot studies are sometime performed to determine if a particular cleanup process will actually work for a particular site. These studies typically involve taking a small amount of the contaminated material and performing tests to evaluate the effectiveness of the cleanup process.

Treatability studies are often started during the remedial investigation (RI) phase, particularly when the remedial design and feasibility study are performed concurrently. Performing treatability studies early in the process provides site-specific performance and conceptual design information that can be used during the evaluation of remediation alternatives. When immediate risks posed by a site must be mitigated quickly, prior to completion of the entire remedial investigation and feasibility study, treatability studies can also be very helpful

Bench-scale and pilot-scale studies help determine treatment technologies for contaminated soil, groundwater, and wastewater. These studies use a variety of technologies including bioremediation, soil vapor extraction, soil fixation, soil washing, chemical precipitation, and filtration.

5.2.7 REMEDIAL ACTION

This section summarizes the common remedial technologies. Each technology belongs to one of the following categories:

- No Action:* Monitoring and inspection technologies that do not contribute to actual remediation of site conditions.
- Institutional Actions:* Indirect methods of reducing exposure to site hazards, such as a notation on the deed warning about the presence of the contamination, zoning restrictions, or restrictions on the use of groundwater.
- Containment:* Physical isolation of solid waste, groundwater, or other contaminated material.
- Treatment:* Alteration of solid waste, groundwater, or other affected material to reduce the toxicity, mobility, or volume of contamination.
- Disposal:* Placement of solid waste, treatment residuals, or affected material into a secure disposal facility, or discharge of treated water to the environment.

If site remediation is required, two or more technologies may be used in combination to provide a comprehensive approach to site remediation. The use of treatment technology to reduce the toxicity and volume of affected material (combined with a containment technology to reduce the mobility of residual contamination in the treated product) is an example of combined treatment technologies. Table 1 identifies contaminants, mediums and specific remedial technologies.

TABLE 1

Potential Remedial Action Technologies and Applicable Contaminants

TECHNOLOGIES	CONTAMINANTS				
	SOLID WASTE	SOIL	SEDIMENT	GROUND WATER	SURFACE WATER
<i>No Action</i>					
Monitoring	X	X	X	X	X
Site Inspections	X	X	X	X	X
<i>Institutional Actions</i>					
Physical Barriers	X				
Deed Restrictions	X			X	
<i>Containment</i>					
Storm Water Controls	X	X		X	X
Capping	X	X		X	
Vertical Barriers	X	X		X	



TECHNOLOGIES	CONTAMINANTS				
	SOLID WASTE	SOIL	SEDIMENT	GROUND WATER	SURFACE WATER
Filter Barriers	X	X		X	
Subsurface Drains	X	X		X	
<i>Removal</i>					
Excavation	X	X			
Dredging			X		
Recovery Wells				X	
Interceptor Trench				X	
Vacuum Extraction	X	X	X		
<i>Treatment</i>					
Air Stripping (soil)	X	X	X		
Biological (soil)	X	X	X		
Asphalt Batching		X	X		
Soil Flushing	X	X	X		
Stabilization	X	X	X		
Incineration	X	X	X		
Air Stripping (water)				X	X
Biological (water)				X	X
Chemical Precipitation				X	X
GAC Adsorption				X	X
Ion Exchange				X	X
Oxidation-Reduction				X	X
Steam Stripping				X	X
Filtration				X	X
Neutralization				X	X
Off-site Water Treatment				X	X
<i>Disposal</i>					
On-Site Landfill	X	X	X		
Off-Site Landfill	X	X	X		
Surface Water Discharge				X	X
Reinjection				X	

5.2.8 ACTIVITY AND USE LIMITATIONS – LAND-USE CONTROLS AND RESTRICTIONS

Institutional controls are legal and administrative tools that help limit human exposure to contamination on a property by controlling the land or resource use. Institutional Controls (ICs) are also called Land-Use Controls (LUCs), Activity and Use Limitations (AULs), and Environmental Use Restrictions

(EURs). Institutional controls are generally used when a contaminated property is not sufficiently cleaned to support unrestricted use of that property. ICs can limit property uses, such as similar to zoning restrictions that allow commercial but not residential development, or ICs can limit activities, such as fishing prohibitions or groundwater use restrictions.

There are four categories of institutional controls: government controls, proprietary controls, enforcement and permit tools with IC components, and informational devices. Where institutional controls must be effective for a long period, either government or proprietary controls should be considered because they generally run with the land and are enforceable.

- **Government Controls** are usually implemented and enforced by state and local governments and can include zoning restrictions, ordinances, statutes, building permits or other provisions that restrict land or resource use at the site.
- **Proprietary Controls**, such as easements and covenants, have their basis in real property law and involve legal instruments placed in the chain of title of the site. An example of this is an easement that provides access rights to a property so the responsible party or regulatory agency may inspect and monitor a treatment system.
- **Enforcement and Permit Tools** - Under CERCLA, an Administrative Order on Consent (AOC) can be issued to compel the landowner to limit certain activities. Similarly, U.S. EPA can enforce permits, conditions, and issue orders under RCRA.
- **Informational Devices** provide information that contamination may remain on the property. Common examples include state registries of contaminated properties, deed notices, and advisories.

6. FINAL APPROVAL ON ZONING OR LAND-USE

After regulatory programs are addressed and the cleanup has been designed, any remaining approvals regarding zoning or land-use should be completed. There is substantial risk to the development team if some discretionary land-use approvals wait until this late stage in the brownfield redevelopment process. If, for whatever reason, the approvals do not go as expected, significant delays can occur if the development team must redesign the cleanup based on a different land-use program. Therefore, local governments and developers should seek to minimize discretionary land-use approvals at this late stage. See section 4.7 Local Government Review and Applications (on page 17) for more information on zoning and land-use approvals.

7. CLOSING ON THE CONTRACT AND FINANCING

Closing on the contract and finalizing the financing are typically the next steps in the reuse process after the cleanup is designed and all land-use approvals have been finalized. However, closing on the contract and obtaining financing can happen at any time once “All Appropriate Inquiry” is finished.

CASE STUDIES OF
BROWNFIELD REDEVELOPMENT
PROJECTS IN UTAH



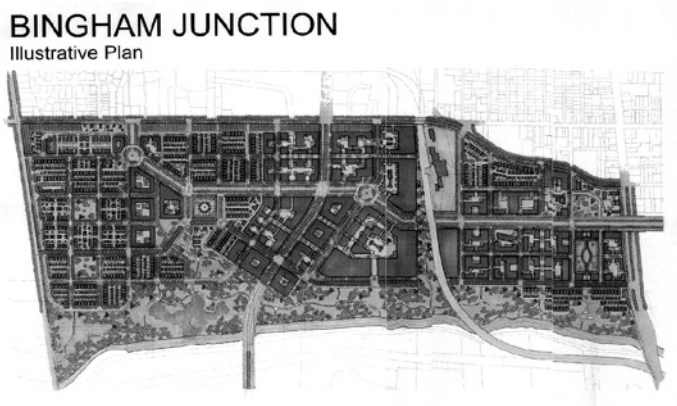
BINGHAM JUNCTION

Used as a smelter site from the 1870s to 1958, the Midvale Slag Superfund site is a 353-acre parcel. After closure of all the site's smelters, the property was sold to a private corporation, which, in turn, sold the remaining slag for road ballast, sandblasting material, and other uses. In 1982, the United States Environmental Protection Agency and the Utah Department of Environmental Quality initiated investigations at the site to explore the extent of environmental contamination. In 1991, the site was placed on the National Priorities List for soil and groundwater contamination levels. The heavy metals present included lead, arsenic, and cadmium. After several years of additional investigation and legal negotiations, the property is now poised for transformation into a mixed-use development – Bingham Junction.

The property's owner initiated a development entitlement process to prepare the site for sale to subsequent developers. The City of Midvale established a Redevelopment Area for the property to help offset the higher costs of development due to the site's hazardous materials. Currently under construction, finished development will consist of 1,800 housing units; 225,000 square feet of office space; 680,000 square feet of retail; 25 acres of mixed-use transit-oriented development; and 71 acres of open space.

PARTICIPATING PARTIES:

- Chapman and Cutler LLP
- City of Midvale
- Utah Department of Environmental Quality
- U.S. Environmental Protection Agency
- Wikstrom Economic and Planning Consultants





CITIFRONT PILOT PROJECT

The Citifront Pilot Project, located at North Temple Street and 600 West in Salt Lake City, was originally slated for use as Olympic-2002-related media housing. However, with the discovery of petroleum-based groundwater contamination during the commercial building demolition phase, the funding and construction processes were put on hold pending resolution of the environmental issues and regulatory approval for site cleanup and closure. The Utah Department of Environmental Quality (UDEQ) performed groundwater monitoring and conducted monthly groundwater cleanup operations (hydrogen peroxide treatments) at the site in 2002 (using \$14,000 of federal U.S. EPA grant monies). UDEQ issued the site a “No Further Action” letter in April 2002, stating that the environmental issues had been resolved. Based on UDEQ’s assessment and cleanup work, the vacant property was finally able to secure financing. Groundbreaking ceremonies were held in May 2002. The finished four-story development will include a combination of 155 affordable housing units mixed with commercial use on the ground floor.

PARTICIPATING PARTIES:

Redevelopment Agency of Salt Lake City
Salt Lake City Housing Division
Salt Lake Neighborhood Housing Services
Utah Department of Environmental Quality
U.S. Environmental Protection Agency





ELSINORE TOWN PARK

Located on the corner of Main and Center Streets in Elsinore, Utah, this former gasoline service station has gasoline contamination from a leaking underground storage tank. In April 2005, UDEQ performed confirmation soil sampling at the site (using federal U.S. EPA grant monies) to determine the need for further corrective action or site closure. Based on this investigation, UDEQ issued a “No Further Action” letter in September 2005, stating that the environmental issues had been resolved through the use of institutional controls. A land-use control for the soil contamination remains on a small portion of the property. Demolition of the abandoned gasoline service station has been completed. A city park is currently in development and will be a beneficial reuse of the underutilized property for the local residents to enjoy for years to come.

PARTICIPATING PARTIES:

Elsinore Town
Utah Department of Environmental Quality
U.S. Environmental Protection Agency





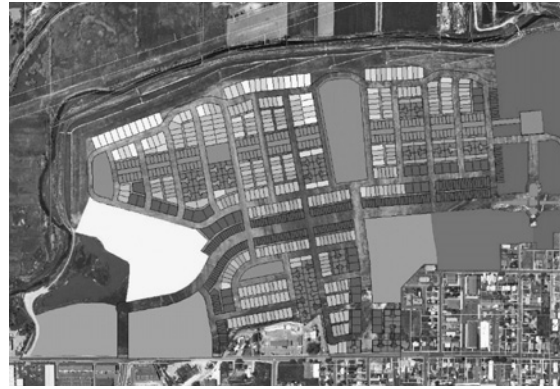
GATEWAY ASSOCIATES MIXED-USE DEVELOPMENT

Located in Salt Lake City's Depot District Project Area, the Gateway Associates' mixed-use project consists of 40-acres previously used as a rail yard and passenger station. Site test results indicated that the soil was contaminated with surface oil/gas and creosote along the existing rail lines. Because of the risk that the Salt Lake City-owned property was contaminated beyond what was discovered during testing, the city purchased environmental insurance to protect against undiscovered environmental problems. Remediation of contaminants took place while Gateway Associates excavated approximately 40 feet in depth to prepare for underground parking structures, including three parking garages and over 2,500 underground parking stalls. Remediation involved removing the site's contaminated soil to an approved location as well as removing contaminated topsoil where excavations did not occur. This site now consists of a \$300 million mixed-use, mixed-income development that incorporates the renovated historic Union Pacific Railroad Depot. This project includes 2.5 million square feet of space for retail and entertainment, office, cultural facilities, a public plaza, underground and structured parking, 500 residential units (including 135 affordable housing units), and a hotel.

PARTICIPATING PARTIES:

Redevelopment Agency of Salt Lake City
The Boyer Company
U.S. Environmental Protection Agency
Utah Department of Environmental Quality





JORDAN VILLAGE

Used as a refinery from 1904 through the early 1970s, the Sharon Steel Superfund site is a 264-acre parcel. In 1988, the property became an U.S. EPA Superfund site and remediation was completed in 1999. The property was taken off the National Priorities List on September 24, 2004.

Creterra, Inc., the project Master Developer, and Midvale's Redevelopment Agency signed the largest Tax Increment Reimbursement Agreement in Utah's History on February 24, 2005. The Tax Increment Package allows the Master Developer to spend approximately \$120,000,000 to pay for extraordinary costs incurred in preparing the land for development and providing low-income housing within the property.

As a mixed-use, walkable community, Jordan Village will combine 100,000 square feet of neighborhood retail; 2,500 residential units; and 400,000 square feet of office and flex commercial uses in a design reminiscent of traditional small towns. The site includes extensive open space tied to regional trail systems and adjoins a future light rail station. Initial construction began in 2005 and the development is expected to be substantially completed by 2012.

The integration of remediation and development is critical to a successful reuse of blighted property. The costs now associated with bringing the site back to beneficial reuse were not adequately accounted for in the initial remediation design. This left the site dormant until the problems could be addressed. If reuse was initially made a priority during the remediation design, it is highly likely a significantly cheaper solution would have been available.

PARTICIPATING PARTIES:

creterra, inc.
Environmental Resource Management
City of Midvale
Snell & Wilmer, L.L.P.
Utah Department of Environmental Quality
U.S. Environmental Protection Agency



ONEQUA CORNER MIXED-USE DEVELOPMENT

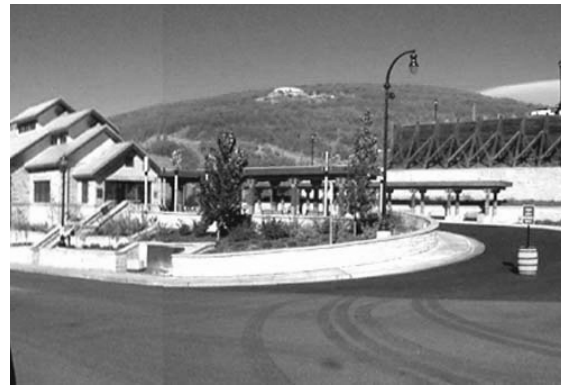
In January 2000, the Redevelopment Agency of Salt Lake City (RDA) purchased the property located at 1285 West 500 North under the Vacant & Boarded Gas Station Program. Through that program, the RDA rehabilitated and revitalized this small, abandoned gas station site. Obtained from the City-Wide Housing Fund (in combination with the Neighborhood Commercial (CN) zoning), the funding required a small, mixed-use project.

When the RDA requested proposals for the parcel in November 2001, Neighborhood Housing Services (NHS) was the only respondent. Because the project's funding was obtained from the City-Wide Housing Fund, one of the two units had to be sold to a buyer whose household income was less than or equal to 80% of Area Median Income (AMI). While the project was small-scale, the mixing of an affordable unit with a market rate unit gave the project a more favorable end result.

By June 2004, the development terms had been finalized and the building construction was completed one year later. Each of the 2,500 square foot units have ground-floor, commercial space and upper-level living accommodations. With its visible location, Onequa Corner features surface parking that is ideal for professionals who desire to operate a business while maintaining a private entrance to the two-bedroom home.

PARTICIPATING PARTIES:

Redevelopment Agency of Salt Lake City
Salt Lake Neighborhood housing Services
Utah Department of Environmental Quality



OLD TOWN INTERMODAL TRANSIT CENTER

Park City's Old Town Intermodal Transit Center is the location of a former lead and silver milling operation (Marsac Mills) during the late 1800's. The site's northern 2.5 acres contained elevated concentrations of lead, arsenic and mercury. In an effort to facilitate the site's remediation and redevelopment, Park City Municipal Corporation (PCMC) entered the site into the State Voluntary Cleanup program in 1999. During the remediation, the property's contaminated soils were either excavated and removed to an appropriate disposal facility or capped onsite.

During the property's redevelopment, PCMC constructed its local and regional transit center to centralize the operations of its various transit modes then in operation. To assist PCMC in maintaining the engineered caps' protectiveness, a site management plan was authorized and institutional controls established. This cleanup addressed soils on the property's northern 2.5 acres. The Upper Silver Creek Stakeholders Group must still address the regional groundwater concerns and the property's southern-half soil issues. A Certificate of Completion was issued on February 19, 2003.

PARTICIPATING PARTIES:

Park City
U.S. Environmental Protection Agency
Utah Department of Environmental Quality



GUIDANCE AND TIPS IN SELECTING A COMPETENT ENVIRONMENTAL CONSULTANT

If not done properly, the investigation, assessment, and remediation of a site can prove to be a frustrating and expensive endeavor for a property owner. Much of this can be avoided, however, if one aligns himself or herself early in the process with a competent and knowledgeable environmental consultant. All too often, identifying an expert consultant who can competently guide you through a myriad of environmental issues can itself prove difficult. The secret is finding the right professional who understands your issues and constraints, and who is skilled in addressing all facets of your unique set of environmental concerns. In today's highly regulated and highly litigious world, selecting the right environmental professional who is keenly aligned with your goals is very important to ensure that your environmental issues are addressed competently, efficiently, and in a manner that meets your legal obligations and financial expectations. The following guidance will assist you in choosing the right professional for your environmental needs.

Why Employ a Competent Environmental Professional?

Selecting a consultant is buying expertise. Before selecting an environmental consultant, you must first recognize that addressing environmental concerns needs to be taken very seriously. The financial and legal consequences of not properly identifying and addressing a site's environmental issues can have profound and long-lasting consequences for you and your financial backers. You should understand that soliciting the assistance of a less-than-competent environmental professional may have serious short- and long-term ramifications. The environmental professional who you ultimately hire should be viewed as an integral part of your overall team to assure your best chances of business and financial success. Thus, it is imperative that the consultant you ultimately select proves to be highly skilled and fully aligned with your needs, goals, and expectations. It is also important to understand that your selected environmental professional should likely be engaged during the earliest stages of project development and planning, rather than later on in the process, when it may prove much more difficult to undo decisions because environmental concerns were not properly addressed during the project's early stages of planning and implementation.

Understanding Your Needs

At its most basic level, the first steps in any Brownfield redevelopment project are to 1) find the property; 2) carefully define the nature of your development; and 3) understand the legal, regulatory, and environmental issues that may impact development plans at the site. Regarding environmental matters, an up-to-date environmental site assessment (often referred to as a Phase I ESA) will assist you in understanding the property's potential environmental concerns. A Phase I ESA's purpose is to address the potential environmental liabilities on a specific parcel of commercial real estate to qualify under property inspection requirements of the Comprehensive Environmental Response, Compensation, and Liability Act's (CERCLA) "Innocent Purchaser/Landowner Defense" and qualify as a Bona Fide Prospective Purchaser (BFPP). Of course, you will need a qualified environmental professional to conduct the Phase I ESA, which may or may not be the same firm that does any subsequent environmental activities at the site.

Even if specifics of the project development are not yet fully defined (which is often the case), design of a conceptual development model and a timeline to implement it is key in establishing the groundwork and potential assessment and remedial activities required for site cleanup. For example, a site that is being redeveloped into an industrial park may require a very different cleanup approach than one that is being developed into high-density residential properties. Similarly, a site that requires a very aggressive cleanup schedule must also be approached differently than one where cleanup activities can progress over a much longer time period. Ultimately, the environmental professional who you choose will likely be responsible for not only offering sound advice to you and your development team, but also overseeing your environmental activities to ensure that the work is completed in a timely and efficient manner that addresses all of your concerns and meets all applicable regulatory requirements.

Where Do I Start?

Once you have a firm understanding of your site's real or conceptual development plans, and before you begin the selection process for engaging an environmental professional, you should have a general idea of the site-specific environmental issues and requirements under specific environmental laws and regulations. This can often be accomplished by having some preliminary discussions with competent legal professionals and/or individuals at government or regulatory agencies that are familiar with the site or sites that are similar in nature to yours.

Once you have established the framework for your proposed development and conceptually understand the environmental regulatory controls, develop a list of potential consultants who can assist you in addressing the site's

environmental liabilities. A good place to start in finding qualified consultants is through recommendations made by legal counsel, trade associations, the Better Business Bureau, or your local or state regulatory agency that are familiar with those who are most qualified to do the work. Internet research may also prove useful in narrowing down the list of possibilities, as well as scanning the Yellow Pages under “Environmental Services” or “Environmental Engineers.” Even when individuals or agencies cannot make direct recommendations, they can often point you in the right direction. Ultimately, you will be looking to find those consultants who appear to have the following qualifications:

- Possess the technical and managerial experience to address your site-specific environmental issues;
- Have a proven track record of cleaning up similar sites on time and within budget;
- Have a firm understanding of your site’s potential regulatory requirements;
- Have established a cooperative relationship with government and regulatory agencies;
- Have a local presence and have been in business for some time; and, perhaps most importantly; and
- Are regarded as innovative and strategic thinkers who are capable of finding the best possible solution to your environmental issues and are capable of working well under time and budgetary constraints.

Note that “cost” does not yet factor into the decision-making process – that comes later. Whereas cost is always a factor, finding a highly skilled and competent environmental consultant at this stage is more important than finding out what it will cost to employ their services. The old adage “you get what you pay for” applies just as much to employing a consultant as it does with many other business aspects. Ultimately, finding the right professional who will efficiently get the job done will often prove far more cost effective than simply selecting a firm based solely on price considerations. During this early stage of the selection process, it is recommended that you identify at least three candidates for further consideration.

Interviewing Potential Candidates

Once you have made your initial selection of potential environmental consultants, speak directly with your short list of professionals you have identified. Prior to asking them specific questions, be prepared to supply the consultants with the following background information:

- who you are, what you do, and where you are located;
- where the site is located and its approximate size;

- a brief history on the site and current site conditions;
- potential areas of environmental concern as you understand them;
- a brief outline of your development plans and a timetable to have the work completed; and
- your expectations of the consultant.

If the consultant or firm is not interested in a dialogue that delves deeper into the specifics of your brownfield redevelopment project and the issues that surround it, or if all you hear is a “sure, we can do that” type of response, you should probably look elsewhere for assistance. The initial telephone interview is a time to screen potential candidates for their specific qualifications and determine if there appears to be synergy and a natural fit between parties. The following are potential questions to get answered from each firm, you interview during this initial screening process:

- Have them describe their overall qualifications, professional and ethical reputation, financial stability, longevity of their firm, and the individuals who would likely be working on your project.
- Have them describe their experience and success in dealing with your particular issues.
- Ask them how their approach to your environmental assessment and cleanup activities might potentially differ from other consultants that you are considering.
- Have them describe their experiences and relationships in dealing with relevant environmental regulations and agencies.
- Inquire as to whether their office is part of a larger network of offices, and if so, how do they utilize outside resources within their firm that may be asked to assist them on this project.
- Have them describe some examples where client expectations were met or exceeded in services provided, timeframe, and budget.
- Ask them how they deal with projected cost overruns and out-of-scope work.
- Have them describe their billing rates, per diem rates, how bills are itemized, invoicing procedures, and other fee options besides the standard time-and-materials billings (e.g., time-and-materials not to exceed, lump sum, guaranteed performance, fee based on meeting specific milestones, etc.).
- Inquire how they contractually engage with a client.
- Have them describe their company’s professional errors and omissions and liability insurance programs.
- Have them describe their progress-reporting procedures and typical communication pathways.

- Ask if they can supply you with a list of references.
- If subcontractors are to be used, inquire as to the methods they employ for confirming qualifications of the subcontractors and how such pass-on costs are typically billed out to you. Also, ask if subcontractors are selected by a competitive-bid process.
- Inquire about any potential conflicts of interest and confidentiality issues that the consultant may have with working on your project.

Narrowing the Field and Making the Final Selection

Based on your discussions and the feedback you received from each of the potential candidates, narrow the field and make the selection. Whereas some people believe it is helpful, rarely will a prospective consultant supply you with references who would not offer up glowing accolades about their firm. The usefulness of checking references can be somewhat dubious, but it is worth considering if it will provide you with additional insights into the firm you are considering. A certain amount of valuable information about the ability of the consultant to communicate, to stay on schedule, and to keep costs to a minimum, can sometimes be obtained by interviewing their references.

One consideration is to additionally have a face-to-face meeting with the prospective consultant. If that meeting goes well, you will be well positioned to make a final selection; and if not, you should consider also meeting with your next, or additional, prospective consultants.

While it is fine having them meet you at your office or at the consultant's office, sometimes it's better having the consultant meet you at the actual site for a walk-through of the property. Not only does a site meeting provide the prospective consultant time to actually observe site conditions and potentially provide you with additional insights based on those observations, but it normally proves helpful for the consultant to actually observe site conditions and thus be in a better position to offering options and solutions. Either way, a face-to-face meeting provides an opportune time to further explore issues, ask additional questions, and confirm whether it appears you can work closely with the firm in the coming months. This is also the time to further explore with them their conceptual approach to your environmental issues, and their read on the regulatory issues. Understand, however, that the consultant's time is valuable, too, and if there is any sense that you are wasting their time because you are not prepared to discuss specifics of the job or are simply "sending out feelers," then you will not likely get much in return. They, like you, do not want to be wasting time on something that they may perceive as having only a limited chance of success due to you not being prepared to engage them in a timely manner.

The final step prior to selection should involve having your potential consultant (or narrowed list of consultants) provide you with a detailed description of the work to be completed, an associated detailed cost estimate with an explanation of how cost estimates were generated, a statement of qualifications, and any other information you deem relevant. Be cautious of cost estimates that are significantly higher or lower than those received from other consultants, as they may not include all phases of the project. A questionable practice by some consultants is to bid low and boost the cost estimate through change orders once they are engaged and the work has begun. Ask the consultant how they can get the job done more economically, or whether they think proposals from other consultants are incomplete. Also, watch for consultants who expect to get the work done much faster than others. There may be good reasons for faster cleanups, but you need to understand those reasons. For instance, sometimes the least disruptive and least costly cleanups, such as natural attenuation of contamination, take the longest to complete. Remember, too, that the most important attribute of the cost estimate is not the bottom-line total, but the value it represents. Be sure that the cost is commensurate to the quality of technical expertise, the overall services supplied, and that it will ultimately achieve the desired results.

Review all of this information, taking into consideration whether or not the consultant provided the requested information and has the appropriate level of detail. This also allows you an opportunity to confirm that the consultant fully understands the scope of work and the deliverables you are requesting. Make the selection based on the consultant that best meets your project needs.

Follow-up Issues After Selection

Once a final selection is made, you should be prepared to engage the consultant. Contracts must be written that fully describe the services being provided and other relevant issues. The contract, at a minimum, should address the scope and nature of the work, the need for progress and update reports, indemnity language, limits on liability and insurance, information flow and document retention procedures, and methods of billing. Be sure it includes language that allows you to terminate the contract if you are not satisfied with the consultant's work. Most consultants will supply you with their own contract, but you may want to draft your own version. Legal counsel is often utilized to assist you with this process.

Once the contract is executed and the project begins, the consultant must be managed throughout the life of the contract. This ensures that the project moves forward on schedule and within budget to a successful conclusion.

Final Thoughts

The commitment of the environmental professionals whom you employ for your project is critical to its success. Most clients and consultants will universally agree that some of the best and most cost-effective projects are those in which all parties work closely together throughout the project's life. Make sure you are comfortable with the consultant from the very beginning, and that both of you are on the same page as to what is expected and how it will all get done.

Finally, selecting an environmental consulting firm is not an easy task, and choosing a consultant on a low-bid basis can be costly in the end (remember – “inexpensive” rarely means “the best”). For those firms that don't understand the regulatory framework and agency requirements, it often results in a situation that can severely derail your development plans and can furthermore result in stiff fines and criminal prosecution. Anytime a consultant tries a hard-sell approach, or tells you that they can reduce technical or legal requirements, he or she is probably not the consultant you should be looking to hire. As with any business situation, using a little common sense and business savvy when hiring a consultant can go a long way, and if something sounds too good to be true, it probably is. Thus, selecting an experienced environmental consultant who can successfully deal with your issues and handle your regulatory negotiations is absolutely essential. Following the guidelines expressed herein should help you make the process focused, productive, and successful.

FOR ADDITIONAL INFORMATION, CONTACT:

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GUIDANCE AND TIPS IN SELECTING AN EFFECTIVE ENVIRONMENTAL INSURANCE BROKER

A competent broker should not just copy your application, send it to several insurance under-writers, and send you copies of the quotes he or she receive back. In today's highly competitive business market, the role of the environmental insurance broker should be that of a true business partner who is driven to see you succeed in all aspects of your operation. Ultimately, the success of that partnership almost always depends on the sound advice you receive and the level of effort you require in obtaining your coverage.

Let's face it... There is a cultural shift going on from the old "putting out fires" and "crisis management" modes to a more proactive decision-making and risk-management process that avoids problems and manages risks before they arise. In other words, anticipating what might go wrong is increasingly becoming a part of the everyday business culture. The active management of risks is quickly becoming an integral part of any successful risk-management program.

Using insurance as a risk-management tool has traditionally formed the backbone of an organization's risk-management program, but procuring insurance is not something that we rank high on our list of "fun" activities. In other words, the typical business mentality is that insurance is a necessary evil that must be dealt with – or risk the wrath of dealing with the potentially disastrous financial consequences of unmanaged risks. Understanding your risks (which many do not), particularly in the environmental arena, is just part of the problem. The larger issue is just how to gain the assistance you need. What is not often taken into consideration, however, is that the success of your program often depends on the level of assistance you receive before, during, and after the insurance procurement process.

When soliciting the assistance of an insurance broker, a common method is to ask the broker to submit his or her qualifications and to provide you with a list of insurance markets that he or she wishes to pursue for the placement. You may decide to initially let each broker deal with their markets to see which broker can bring you the best deal, but this is not always the best strategy. Insurance companies are only supposed to offer one broker their quotation, so you will not be able to test two brokers' skills by comparing quotes from the same market. Instead, it is generally advantageous to let one

broker handle the full submission on your behalf rather than limiting him or her to only select markets. That way, she or he can then best control the flow of information for you to all of the carriers bidding on your work.

Remember, too, that the number of insurance carriers that underwrite stand-alone environmental policies is quite limited, as is the capacity of these markets, their appetite for risk, their ability to obtain re-insurance, and the degree to which they can deviate from their standard policy language. As a result, the broker who works with the most suitable carrier to address your risks may look the best in the end, but may still remain “unqualified” to truly partner with you in providing environmental risk-management services.

The best brokers are experts in the environmental and risk-management fields, have a proven track record of successfully procuring environmental coverages for their clients in a fashion that best fits their client’s needs, know the environmental insurance market inside out, and know which markets are best aligned for the coverage(s) their client seeks. They should also know and be able to work closely with the most suitable underwriters who best understand your operational risks and are most adept at evaluating and underwriting the risks for you.

Questions to ask potential brokers at the beginning of your selection process may include the following:

- Are they familiar with your particular industry or business sector?
- Are they willing to take the time to truly understand your risks and concerns?
- Have they worked with other similar clients?
- Who will comprise the team on your account and what is/are their background(s), expertise, and experience?
- If a team is involved, are the team members local or part of a national group?
- Are they willing to facilitate a meeting or discussion with potential underwriters so that you have an opportunity to fully explain your own issues and concerns in detail directly to the underwriter?
- Can they easily provide references?
- Will they help you obtain the best insurance program by carefully developing (with your input) a set of underwriting criteria and options, or simply submit your application and related materials based only on generalities?
- What is the broker’s preferred insurance markets and what are their reasons for choosing those markets? Good relationships with insurance carriers and underwriters can vastly improve their ability to obtain the best coverage.

- How will your broker be compensated for their effort? Typically a broker is compensated through a pre-negotiated fee or on a commission basis. If on a commission basis, you should also be made aware of the percentage rate he or she will receive and whether it includes any “hidden” fees where the broker, or their company, is further compensated through “backdoor” deals with insurance carriers (often referred to as “contingent commissions” or “service agreements”). Furthermore, you should also inquire as to whether they are salaried employees of their firm or if they are heavily compensated by personally sharing in a portion of the sales commission that the broker receives. If they receive a hefty commission based on the premium, then they may be more inclined to try to sell you more than what you actually need or want.

Answers to these questions should provide much needed insight in selecting a knowledgeable and trustworthy broker. In other words, your environmental broker should be articulate, knowledgeable, experienced, and willing to truly partner with you. You should also establish up-front the terms under which the broker will be compensated and understand what “extended” services are included within any broker’s fee (such as dealing with future claims issues and/or addressing any needed changes in the terms and conditions of the bound policy).

Keep in mind, too, that it’s also the intangibles that may cost you in the end. Although you may be able to obtain the coverage you are seeking from your “general” broker, if it’s poorly negotiated – by including unreasonably restrictive terms, conditions, and policy language – then that all could prove costly if reliance on the policy is needed sometime in the future. Thus, one of the worst things that can happen is to rely solely on the cost of the premium as the deciding factor when obtaining the coverage without also considering all of the other very important aspects of the policy.

FOR ADDITIONAL INFORMATION, CONTACT:

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ADDITIONAL BROWNFIELD INFORMATION SOURCES

Brownfields National Conference

Website: <http://www.brownfields2006.org>

Primary Function: The official U.S. EPA and International City/County Management Association (ICMA) cosponsors forums on brownfields cleanup, redevelopment, and reuse. Learn about convention events and registration. Links to vendors and useful brownfields related information.

Contact Info: 1-877-343-5374

Links: www.icma.org
www.epa.gov/brownfields/

International City/County Management Association (ICMA)

Website: www.icma.org

Primary Function: Provides information about the ICMA's purpose and function and how to become a member.

Contact Info: Main No.: 1-202-289-4262
Member Services: 1-202-962-3680

Salt Lake City Gateway & Brownfields Resource Center

Website: www.slcgov.com/ced/rda/brownfields/

Primary Function: Resource information regarding the pilot Gateway project and general information about redevelopment efforts in the Gateway, including environmental contamination and cleanup incentives for the community. This site also has a link to “Assistance for Current or Prospective Property Owners.” This website is full of information pertaining to brownfields. Definition of terms and corresponding explanation of rationale make this website a great entry point into the world of brownfield development. Specific examples are used to demonstrate successful developments to help guide individuals in their inquiry.

Contact Info: Salt Lake City Corporation
451 S. State Street, Salt Lake City, UT 84111

United States Environmental Protection Agency

Website: www.epa.gov/brownfields/

Primary Function: The Environmental Protection Agency’s official brownfield cleanup and redevelopment website. This site defines brownfield sites and identifies the rationale behind redeveloping brownfield sites. It provides information about the U.S. EPA’s Brownfields Program, including laws, grants, technical tools, resources and information about projects across the country. This site contains quick links to the Federal Programs Guide, State Brownfields and Voluntary Response Programs, Success Stories, Upcoming Events, Brownfields Law, Frequently Asked Questions, Partnerships, and Initiatives.

Contact Info: 1-202-566-2777

Links: www.epa.gov/brownfields/toolsandtech.htm
www.epa.gov/brownfields/initiatives.htm
www.epa.gov/brownfields/newsroom.htm

United States Environmental Protection Agency

Website: www.epa.gov/swerosps/bf/success/houston.pdf

Primary Function: Describes a brownfield success story in which the Houston Brownfield Assessment Pilot (HBAP) program identified and redeveloped a brownfield property into Enron Field, home of the Houston Astros Baseball Team. The article describes what the HBAP does and its contributions to the community. It lists facts and numbers associated with the inner-city development projects and how HBAP is developing other areas of Houston.

Contact Info: 1-800-227-8917

Links: website: www.epa.gov/brownfields/

United States Environmental Protection Agency

Website: www.epa.gov/swerosps/bf/success/saltlake.pdf

Primary Function: Describes the “Gateway” redevelopment project in Salt Lake City. The article lists facts about money received from the U.S. EPA, time rendered in the brownfield’s redevelopment, additions to the final mall project, and portions of the planning stage. Look here if you want to know this development’s fiscal impact and its plans for the future.

Contact Info: 1-800-227-8917

Links: website: www.epa.gov/brownfields/

The Division of Environmental Response and Remediation

Website: www.environmentalresponse.utah.gov/

Primary Function: Website for the Utah Division of Environmental Response and Remediation (DERR). DERR is charged with protecting public health and Utah's environment through cleanup of chemically contaminated sites. They ensure that underground petroleum storage tanks are used properly and provide chemical usage and emission data to the public and local response agencies. This website provides information on local government records and interactive DERR maps.

Contact Info: 801-536-4100

Links: www.utah.gov

The Division of Environmental Response and Remediation

Website: www.environmentalresponse.utah.gov/vcp/index.htm

Primary Function: This is an excellent brownfield site that describes brownfield issues and current Voluntary Cleanup Programs (VCP's). This site also gives a table of Utah brownfield sites under development and their location. There are many useful links on this page.

Links: Brownfield Conference in Denver, CO in November:
www.brownfields2005.org
Brownfield Technology Support Center:
www.brownfieldstsc.org
The National Association of Local Government
Environmental Professionals (NALGEP):
(a not-for-profit organization that represents local
government personnel responsible for ensuring
environmental compliance and developing and
implementing environmental policies and programs)
www.nalgep.org

Utah Automated Geographic Reference Center (Utah AGRC)

Web Site:

agrc.its.state.ut.us/agrc_sgid/sgidlib/sgid100_brownfieldprojects.htm

Primary Function: This site provides access to Utah brownfield projects through downloadable database files. It is available statewide. The program allows you to create shape files to demonstrate the characteristics of surveyed land. This information is not viewable without the appropriate viewing software (GIS based).

Contact Info: 1-801-538-3072.
FAX: 801-538-3317
5130 State Office Building
Salt Lake City, Utah 84114

Links: agrc.its.state.ut.us

GLOSSARY OF COMMON TERMS ASSOCIATED WITH BROWNFIELD REDEVELOPMENT SITES

DISCLAIMER: This glossary is intended to assist the public understand some of the more commonly used terms associated with environmental assessments and cleanups, especially as they relate to brownfield redevelopments. The definitions provided herein do not necessarily provide official or legal definitions of certain terms, nor do they necessarily describe how certain words or terms may be used differently by various groups or entities.

Acceptable Risk Level: The level of contamination at a site below which no significant harm will occur to human health and the environment. Acceptable risk levels are used to determine how much cleanup must occur at a site.

Action Level: The existence of a contaminant concentration in the environment high enough to warrant action or trigger a response under a specific or various regulatory programs.

Activity and Use Limitations (AULs): Legal or physical restrictions or limitations on the use of (or access) to a site or facility that 1) reduces or eliminates potential exposure to hazardous substances or petroleum products in the soil or groundwater on the property; or 2) prevents activities that could interfere with the effectiveness of a response action, in order to ensure maintenance of a condition of no significant risk to public health or the environment.

Administrative Order: A legal document signed by a regulatory agency (typically the U.S. EPA) directing an individual, business, or other entity to take corrective action or refrain from an activity. It describes the violations and actions to be taken and can be enforced in court.

Administrative Order of Consent (AOC): A legal agreement signed between a regulatory agency (typically the U.S. EPA) and an individual, business, or other entity through which the violator agrees to pay for correction of violations, take the required corrective or cleanup actions, or refrain from an activity. It describes the actions to be taken, may be subject to a comment period, applies to civil actions, and can be enforced in court.

Administrative Record: All documents which a regulatory agency (typically the U.S. EPA) considered or relied upon in selecting the response action at a remedial site, culminating in the Record of Decision for remedial action or, an action memorandum for removal actions.

Above Ground Storage Tank (AST): Any one or combination of tanks (including underground pipes connected thereto) which is used to contain an accumulation of potential groundwater contaminants and the volume of which (including the volume of underground pipes connected thereto) is less than ten percent beneath the surface of the ground. Flow-through process tanks are excluded from the definition of above ground storage tanks.

Air Sparging: A treatment technology where air is pumped into the ground to aid in the removal of volatile substances.

Air Stripping: A treatment technology where contaminated water is run over packing material or trays inside an enclosed chamber to increase the surface area of the water and aid in the removal of volatile substances. The volatiles evaporate from the water and are collected in air filters or released to the atmosphere.

All Appropriate Inquiry (AAI): As part of the 2002 Small Business Liability Relief and Revitalization Act, AAI establishes specific regulatory requirements for conducting all appropriate inquiries into the previous ownership, uses, and environmental conditions of a property for the purposes of qualifying for certain landowner liability protections under regulatory authority. All appropriate inquiries must be conducted in compliance with either the AAI or the ASTM E1527 to qualify as an innocent landowner, an innocent contiguous property owner, or a bona fide prospective purchaser.

Applicable or Relevant and Appropriate Requirements (ARARs): Any state or federal statute that pertains to protection of human life and the environment in addressing specific conditions or use of a particular cleanup technology at a Superfund site.

Aquifer: A geological formation capable of storing and yielding significant quantities of water. It is usually composed of sand, gravel, or permeable rock which lies upon a layer of clay or other impermeable material. This impermeable layer does not allow the water to penetrate to lower depths.

Areas of Concern (AOC): An environment identified as a potential pollution risk.
ASTM E1527 Standard: A practice developed by the American Society for Testing and Materials (ASTM) for conducting Phase I Environmental Site Assessments. Its purpose is to define good commercial and customary practice in the U.S. for conducting an environmental site assessment of a parcel of commercial real estate with respect to petroleum products and the range of contaminants within the scope of CERCLA.

Attenuation: The process by which a compound is reduced in concentration over time through absorption, adsorption, degradation, dilution, and/or transformation.
Baseline Risk Assessment (BRA): A risk assessment conducted before cleanup occurs. Sites that do not present an unacceptable risk may not need to be cleaned up. The risk assessment may include, but is not limited to, deterministic risk assessment, ecological risk assessment, human health risk assessment, probabilistic risk assessment, and residual risk assessment.

Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX): A group of toxic chemicals that are commonly associated with gasoline and other light petroleum products.

Biodegradation: The natural breakdown of a substance by microscopic organisms.

Bioremediation: The use of microscopic organisms to remove contamination from a site. Bioremediation techniques generally involve adding nutrients (or otherwise altering site conditions) to speed up the natural process of biodegradation.

Bona Fide Prospective Purchaser (BFPP): The 2002 Small Business Liability Relief and Revitalization Act provides CERCLA liability protection to the purchaser of a contaminated property, provided that the owner can prove that contamination occurred prior to purchase and can demonstrate that they did not know of the existence of contamination on the target property at the time of purchase. To qualify, a person must make all appropriate inquiry on or before the date of purchase and the property must have been purchased after January 11, 2002.

Brownfield: With certain legal exclusions and additions, the term “brownfield site” means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of environmental contamination or the fear of such contamination. Brownfield properties vary in size, location, age, and past use. Examples of brownfield properties can be anything from a five hundred acre closed steel mill to a small abandoned corner gas station.

Brownfield Redevelopment Authority: A local governing body that provides decision making and control of brownfield redevelopment projects.

Carcinogen: Any substance that may cause cancer, as identified by the U.S. EPA.

Carcinogenic Risk: A defined excess lifetime risk that defines the likelihood of a human in developing a cancer or tumor from a lifetime exposure to a carcinogen, not including exposure to cancer-causing background chemicals.

Certificate of Completion: A written verification from a state voluntary cleanup or brownfield program that a site has been cleaned up in a manner satisfactory to the state. In some states, a certificate provides liability protection, but in most states, liability relief must be obtained through another mechanism such as a covenant not to sue.

Clean Fill: Uncontaminated soil that is typically used to re-grade a site after contaminated soil has been removed.

Cleanup: Actions taken to deal with a release or threat of release of a hazardous substance that could affect humans and/or the environment. The term “cleanup” is sometimes used interchangeably with the terms remedial action, removal action, response action, or corrective action.

Cleanup Approval Letter: A written verification from a state voluntary cleanup or brownfield program that a site has been cleaned up in a manner satisfactory to the lead regulatory agency.

Cleanup Cost Cap (CCC) Program: An insurance program, also referred to as Remediation Stop Loss (RSL) coverage, which is designed to protect responsible parties from cost overruns of known environmental liabilities associated with a regulatory-driven environmental remediation project.

Comfort Letter: Letter from a regulatory agency that typically states that a site complies with the regulatory agency’s requirements, is clean enough for the intended use, and that no future enforcement action is expected unless conditions or uses of the site change. The letter typically does not provide legally enforceable rights such as relief from liability.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): Created the “Superfund” to finance the cleanup of abandoned hazardous waste dumpsites. Under 42 U.S.C. §§ 9601 to 9675, this law provides federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA provides for the liability of persons responsible for releases of hazardous waste at these sites and establishes a trust fund to provide for cleanup when no responsible party can be identified.

Conceptual Site Model: A summary of conditions at a site that identifies the type and location of all potential sources of contamination and how and where human health and the environment may be compromised due to the presence of contamination.

Confirmation Sampling: Air, soil, groundwater, surface water, or sediment samples taken after a cleanup to confirm that the cleanup was effective in removing hazardous substances. Can also refer to sampling conducted to update old sampling data.

Consent Decree: A legally enforceable document approved by a judge that formalizes an agreement reached between a regulatory agency (typically the U.S. EPA) and potentially responsible parties (PRPs) through which PRPs will conduct all or part of a cleanup action at a Superfund site, cease or correct actions or processes that are polluting the environment, or otherwise comply with regulatory enforcement actions to resolve the contamination at the site. The Consent Decree describes the actions PRPs will take and may be subject to a public comment period.

Consent Order: A legally enforceable agreement between a regulatory agency (typically the U.S. EPA) and a potentially responsible party requiring the party to participate in the investigation or cleanup of a site. An administrative law judge decides disputes.

Contaminant: Any regulated physical, chemical, biological, or radiological substance or matter that has an adverse effect on air, water, soil, or other media above the currently established level of detection.

Contaminants (or Constituents) of Concern (COC): Specific chemicals (usually the most hazardous ones) at a site that are chosen to be evaluated through a Risk Assessment. Some categories of chemicals, such as polynuclear aromatic hydrocarbons (PAHs) or volatile organic compounds (VOCs) have dozens of individual constituents. Instead of evaluating each one, a few are chosen to represent the hazards posed by the whole group.

Contiguous Property Owner Liability Protection (CPO): In 2002, the Small Business Liability Relief and Revitalization Act provided CERCLA liability protection to the purchaser of a contaminated property, provided that 1) the owner can prove that contamination originated and migrated from an adjacent property, and 2) the owner can demonstrate that they did not know of the existence of contamination on the target property at the time of purchase. To qualify, a person must make all appropriate inquiry on or before the date of purchase and the property must have been purchased after January 11, 2002.

Corrective Action Plan (CAP): A document that describes the recommended site remedy under the federal RCRA law (Resource Conservation and Recovery Act).

Covenant Not to Sue: A written promise by a state government that it will not take legal action or require additional cleanup by a party that satisfactorily cleans up a property under a state brownfield or voluntary cleanup program.

Cradle-to-Grave or Manifest System: A procedure in which hazardous materials are identified and followed as they are produced, treated, transported, and disposed of by a series of permanent, linkable, or descriptive documents (e.g., manifests).

Cumulative Excess Cancer Risk: The upper bound on the estimated cancer risk above the background risk associated with exposure to multiple hazardous substances or multiple exposure pathways.

Deed Restriction: A limitation on the use of a property that is recorded on the deed to the property. The limitations on use are legally enforceable against the owner of the property, but who may enforce the limitation depends on state law.

Dense Non-Aqueous Phase Liquid (DNAPL): Non-aqueous phase liquids such as chlorinated hydrocarbon solvents or petroleum fractions with a specific gravity greater than 1.0 that sink through the water column until they reach a confining layer. Because they are at the bottom of aquifers instead of floating on the water table, typical monitoring wells do not indicate their presence.

Deterministic Risk Assessment: The traditional approach to estimating a site's potential risk by solving the risk algorithm (intake multiplied by the dose-response) analytically. This is done by assigning the average or high-end values in the algorithm to calculate the risk (dependent variable) posed by the independent variables (such as exposure factors and exposure point concentrations that produce the intake).

Due Diligence: Evaluation of the environmental condition of a parcel of land, often as part of a real estate transaction. Due diligence activities include investigating and learning critical information about property before a purchaser buys or makes a loan secured by the property. In addition to investigating and assessing the environmental conditions and risks associated with the property, buyers and lenders will also need to investigate and assess a variety of other matters to determine that the property is what it purports to be and will adequately serve their needs and future development plans.

Ecological Receptor: Specific ecological communities, populations, or individual organisms protected by federal or state laws and/or regulations, or those local populations that provide important natural or economic resources, functions, and values.

Ecological Risk Assessment: Qualitative or quantitative appraisal of the effect of a stressor or stressors (e.g., chemicals, alteration of habitats, or introduction of new species) that may affect the non-human environment.

Effects Range Median (ERM): Contaminants in sediment that have adverse effects on animals that live in sediment.

Enforcement: Federal, state, or local legal actions to obtain compliance with environmental laws, rules, regulations, or agreements and/or obtain penalties or criminal sanctions for violations. Enforcement procedures may vary, depending on the requirements of different environmental laws and related implementing regulations. Under CERCLA, for example, the U.S. EPA will seek to require potentially responsible parties to clean up a Superfund site. In certain other situations, if investigations by the U.S. EPA and state agencies uncover willful violations, the U.S. EPA seeks criminal trials and penalties.

Engineering Controls (ECs): Physical modifications to a site or facility (e.g., fencing, capping, slurry walls, or point of use water treatment) to reduce or eliminate the potential for exposure to hazardous substances or petroleum products in the soil or groundwater on the property. Engineering controls often limit land use options.

Environmental Contamination: The presence of hazardous substances or constituents that pose unacceptable risks to the environment, humans, or ecological receptors.

Environmental Lien: A charge, security, or encumbrance on a property's title to secure payment of cost or debt arising from response actions, cleanup, or other remediation of hazardous substances or petroleum products.

Environmental Indemnity Agreement (EIA): An executed legal agreement, typically between a purchaser and seller of a property, that defines site environmental liabilities that will be transferred or will remain, between each of the parties involved.

Environmental Insurance: A contract between an insurance company and the insured that is used to eliminate or reduce the financial risk of a brownfields transaction. In exchange for payment, an insurance company agrees to accept the risk of the owner being held liable under state or federal laws for cleanup costs or damages above a specified amount.

Environmental Site Assessment (ESA): An investigation of a property, often funded by a potential buyer or seller of the property, that investigates whether the property may be contaminated with hazardous substances. There are two types of ESAs: 1) a Phase I ESA generally consisting of a site visit and agency record review to determine if there are obvious potential environmental problems at or near the site, and 2) a Phase II ESA generally including the collection and analysis of air, soil, groundwater, surface water, and/or sediment samples from the site to determine the presence or absence of contamination.

Environmental Site Audit: An independent assessment of the current status of a party's compliance with applicable environmental requirements or of a party's environmental compliance policies, practices, and controls.

Exposure: Contact of an organism with a chemical or physical agent. Exposure is quantified by exposure point concentration in an exposure medium (e.g., soil, sediment, air, groundwater, and surface water) and the intake of the medium (expressed as the amount of the medium taken into the body by the organism per unit body weight per day).

Exposure Assessment: Identification of potential exposure scenarios under both “residential” and “actual land use or potential land use” conditions. The fate and transport processes influencing the environmental behavior of the chemicals of concern are considered, and conceptual site models are developed, to depict probable source areas, contaminant migration pathways, plausible exposure points, and exposure routes.

Exposure Factors: Values used to estimate exposure in risk assessment, such as the number of days of exposure per year, number of years that exposure is expected to occur, the amount of contaminated media that a person or an organism might contact per day, the extent of uptake or absorption of the medium contacted, and the body weight.

Exposure Pathway: The manner by which a person or an organism may be exposed to a chemical of concern or contaminant. A complete exposure pathway consists of a source, a release from a source, a migration and transport mechanism, an exposure medium (e.g., air) or media (in cases of intermediate transfer), an exposure point, and an exposure route.

Exposure Point Concentrations (EPCs): The amount of a chemical of concern available at the exchange boundaries of the organism (e.g., skin, lungs, gut) for absorption.

Exposure Route: The portal of entry that results in the intake of a contaminated medium into the human body or an organism (e.g., ingestion, dermal contact, and inhalation).

Fate and Transport: The behavior and movement of a chemical through an environmental medium. The movement is affected by many factors such as sunlight (UV radiation), wind-blown or wave actions, microbial activity, groundwater and surface water flow, chemical properties (e.g., solubility, density), physical-chemical properties of the medium (e.g., grain size, porosity, permeability, and organic carbon content), and presence of solubility-enhancing solvents or buried piping and utilities.

Feasibility Study (FS): A study that evaluates the costs and effectiveness of various strategies for cleaning up a site. This study always includes a “no action” alternative, which is an evaluation of the costs and consequences of not cleaning up the site.

Free Product: A discharged hazardous substance or environmental pollutant that is present in the environment as a floating or sinking non-aqueous phase liquid. Free Product is considered present if 1) measurable using best available technologies; 2) for groundwater, the concentration of the chemical of concern is at or above the aqueous solubility limit for that pure compound or the effective solubility limit for that compound in a chemical mixture; or 3) for soils, the concentration of the chemical of concern is at or above the soil saturation limit for that compound for all chemicals with a melting point less than 30 degrees Celsius.

Greenfield: A property that has not been previously developed.

Groundwater Quality Standard: The chemical-specific numerical value published by the U.S. EPA, above which, a groundwater contamination level is exceeded.

Hazardous Chemical: A U.S. EPA designation for any hazardous material requiring a Material Safety Data Sheet (MSDS) under OSHA's Hazard Communication Standard. Such substances are capable of producing fires and explosions or adverse health effects like cancer and dermatitis. Hazardous chemicals are distinct from hazardous waste.

Hazard Index (HI): The sum of the hazard quotients for multiple substances and/or multiple exposure pathways.

Hazard Quotient (HQ): The ratio between the exposure point concentrations and the toxicity reference values (TRVs) for particular chemicals and their effect on representative species.

Hazard Ranking System (HRS): A scoring system used by U.S. EPA to prioritize sites for investigation and cleanup under the federal Superfund program. Sites that score above 28.5 (on a 100-point scale) qualify for listing on the National Priorities List (NPL) and cleanup under Superfund.

Hazardous Substance: Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive. Typically, this means any substance that is a hazardous substance as defined under Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, and any substance that is designated as a hazardous substance under Section 102 under CERCLA.

Hazardous Waste: Substances that can pose a substantial or potential hazard to human health or the environment when improperly managed and that possess at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or appear on special U.S. EPA lists. Specific definitions of the general characteristics of hazardous waste are found in 40 CFR 261.2.

Health & Safety Plan (HSP): A written plan prepared by a contractor that describes the procedures and equipment the contractor will have in place at a site to prevent site workers from becoming sick or injured while conducting an investigation or cleanup.

Heavy Metals: A generic term for a group of naturally occurring elements with high molecular weights that are generally toxic in low concentrations. Heavy metals include arsenic, cadmium, chromium, copper, iron, lead, mercury, and zinc.

Hot Spot: An area of contamination at a site where the hazardous substances are particularly concentrated or mobile and exceed acceptable risk levels.

Human Health Risk Assessment: A Risk Assessment that looks at the threats posed to people at the site, entering the site, or living near the site.

Hydrocarbons: A large group of chemicals containing carbon and hydrogen atoms. Hydrocarbons are generally associated with petroleum products (e.g., heating oil, gasoline, kerosene, and asphalt).

Indemnification: An agreement that provides for one party to bear the costs (either directly or by reimbursement) for damages or losses incurred by a second party.

Infill Development: Development on vacant or underused sites in a developed area.

Innocent Landowner Defense (ILD): A person may qualify as one of three types of innocent landowners: 1) a person who “did not know and had no reason to know” that contamination existed on the property at the time the purchaser acquired the property; 2) a government entity that acquired the property by escheat, or through any other involuntary transfer or acquisition, or through the exercise of eminent domain authority by purchase or condemnation; and/or 3) a person who “acquired the facility by inheritance or bequest.” To qualify for the innocent landowner LLP, such person must have made all appropriate inquiry on or before the date of purchase. Furthermore, appropriate due diligence activities must not have resulted in knowledge of the contamination. If it does, then such person did “know” or “had reason to know” of contamination and would not be eligible for the innocent landowner defense.

Institutional and Engineering Control (IC): Legal or physical limitations imposed on the use of a property, such as deed restrictions and covenants, easements, or zoning, imposed on the use of, or access to, a site or facility to 1) reduce or eliminate potential exposure to hazardous substances or petroleum products in the soil or groundwater on the property; or 2) prevent activities that could interfere with the effectiveness of a response action to ensure maintenance of a condition of no significant risk to public health or the environment.

Interim Remedial Measures (IRM): A discrete set of activities to address both emergency and non-emergency site conditions, which can be undertaken without extensive investigation and evaluation, to prevent, mitigate, or remedy environmental damage or the consequences of environmental damage attributable to a site. Its purpose is to lessen obvious hazardous waste risks to the environment and/or public health and is intended to function as a temporary rather than final remedial response to the problem. The IRM should serve to reduce the scope and cost of the final remedy. An IRM may become the final remedy if it achieves the goal of restoring the site to predisposal conditions (to the extent feasible and authorized by law) and minimally achieves the elimination or mitigation of all significant threats to the public health and/or to the environment presented at the site.

Land Farm Treatment: A treatment technology where contaminated soil is specially managed to enhance biodegradation. Contaminated soil is mixed with fertilizers and other nutrients, often in a specially-constructed containment facility, to speed up the growth of naturally-occurring bacteria that feed on the hazardous substances.

Landowner Liability Protections (LLP): Under the Brownfields Amendments, these protections include the bona fide prospective purchaser liability protection, contiguous property owner liability protection, and innocent landowner defense from CERCLA liability.

Leaking Underground Storage Tank (LUST): An underground container used to store gasoline, diesel fuel, home heating oil, or other chemicals that is damaged in some way and is leaking its contents into the ground which may contaminate the surrounding environment.

Lender Liability Program: An insurance policy designed to protect commercial real estate lenders from financial loss due to default and the existence of a pollution condition at actionable levels. If a default occurs, the policy typically is designed to cover payment of the remaining unpaid balance of the loan and any accrued interest from the point of default to payment of the claim, or the cost of cleanup that led to the loan default, whichever is less.

Liability Relief or Liability Release: Protection from liability for contamination provided by a state government as an incentive for brownfield cleanups. Releases vary in scope and form and can include covenants not to sue in addition to some types of no-further-action letters and certificates of completion.

Light Non-Aqueous Phase Liquid (LNAPL): A non-aqueous phase liquid with a specific gravity less than 1.0. Because the specific gravity of water is 1.0, most LNAPLs float on top of the water table. Most common petroleum hydrocarbon fuels and lubricating oils are LNAPLs.

Maximum Contaminant Level (MCL): The maximum permissible level of a contaminant in water delivered to any user of a public system, as published by U.S. EPA under the Safe Drinking Water Act (42 United States Code 300f et seq.). MCLs are enforceable standards.

Memorandum of Agreement (MOA): An agreement between the U.S. EPA and the state regulatory agency in which the U.S. EPA promises not to plan or anticipate any federal action against an owner, operator, generator or transporter.

Monitored Natural Attenuation (MNA): The reliance on natural attenuation/degradation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods.

Monitoring Well: A well used to obtain water quality samples or measure groundwater levels.

No Further Action (NFA): Determination made by the U.S. EPA or other regulatory agency following a preliminary assessment that a site does not pose a significant risk and so requires no further activity.

National Contingency Plan (NCP): The federal government's blueprint for responding to both oil spills and hazardous substance releases. The NCP is the result of United State's efforts to develop a national response capability and promote overall coordination among the hierarchy of responders and contingency plans.

Natural Attenuation: The reduction of mass, toxicity, mobility, volume, or concentration of organic contaminants in soil and/or groundwater due to favorable physical, chemical, or biological conditions. The reduction takes place as a result of processes such as biological or chemical degradation, sorption, and others. Natural attenuation may be allowed in lieu of cleanup if there is little chance that the contamination will pose a threat to human health and the environment.

National Priorities List (NPL): The U.S. EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. A site must be on the NPL to receive money from the Trust Fund for remedial action.

Natural Resource Damages (NRD): Injuries caused to natural resources such as streams, wildlife, and wetlands by contamination from a site. The government can, in some cases, compel parties responsible for the injuries to pay damages.

No Further Action (NFA) Letter: A written statement by a regulatory agency that no further investigation or cleanup is necessary at a site. A "blanket" NFA may also be limited to a specific portion of a site (Partial NFA), or may be conditioned on the long-term maintenance of institutional or engineering controls at a site (Conditional NFA).

Nonresidential Use Standard: A cleanup standard, usually expressed as a numerical ratio of parts of a specific contaminant to parts of the medium of concern (e.g., 5 parts of lead per million parts of soil) that describes the maximum concentration of the contaminant in the medium that will not present an unacceptable risk to the health of humans engaging in any activity other than residential or those other activities considered to be substantially similar to residential. The non-residential use standard is usually a less strict cleanup standard than the residential use standard, and a site that meets the non-residential standard is limited in its uses to non-residential activities.

Operable Unit: A discreet portion of a site that is investigated and cleaned up separately from other portions of the site. Dividing a site into two or more operable units allows separate investigations and cleanups to proceed at their own rate.

Operations and Maintenance (O&M): Activities conducted at a site usually after a Remedial Action or other Interim Remedial Measure has been completed to ensure that the action is effective and any treatment systems in place are operating properly, including continued monitoring of site conditions.

Orphan Site: A site with no identified responsible parties or a site where the parties responsible for the contamination are unable or unwilling to conduct an investigation and cleanup.

Parts Per Billion (PPB): Refers to the concentration of a substance in a sample. For example, a concentration of five parts per billion (5 ppb) of benzene means there are five molecules of benzene present in the sample for every 999,999,995 molecules of other substances. The metric equivalents are micrograms per kilogram (ug/kg, used for solid samples, such as soil), and micrograms per liter (ug/L, used for liquid samples, such as groundwater).

Parts Per Million (PPM): Refers to the concentration of a substance in a sample. For example, a concentration of five parts per million (5 ppm) of benzene means there are five molecules of benzene present in the sample for every 999,995 molecules of other substances. The metric equivalents are milligrams per kilogram (ug/kg, used for solid samples, such as soil), and milligrams per liter (ug/L, used for liquid samples, such as groundwater).

Pollutant: Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.

Pollution: Generally defined as the presence of a substance in the environment that because of its chemical composition or quantity prevents the functioning of natural processes and produces undesirable environmental and health effects.

Pollution Legal Liability Program (PLL): An insurance program designed to protect the insured from the consequences brought about by the discovery of previously unknown environmental liabilities at a site.

Polychlorinated Biphenyls (PCBs): A highly stable, highly toxic class of chemicals formerly commonly used as insulating fluids in electrical transformers and capacitors. The U.S. EPA banned PCBs in 1978, but the chemicals are still present in the environment.

Polynuclear Aromatic Hydrocarbons (PAHs): Various hydrocarbon compounds with multiple benzene rings. PAHs are typical components of heavy hydrocarbons (e.g., lubricating oils and asphalt, as well as various wood-treating products (e.g., creosote). Also called Polycyclic Aromatic Hydrocarbons.

Potentially Responsible Party (PRP): Any individual or company—including owners, operators, transporters or generators—potentially responsible for, or contributing to a spill or other contamination at a Superfund site. Whenever possible, through administrative and legal actions, the U.S. EPA requires PRPs to clean up hazardous sites they have contaminated.

Preliminary Assessment (PA): An initial investigation of a potentially contaminated site that includes a review of the site's history and a study of the surrounding area to determine whether the site is contaminated and what threats may be posed by that contamination.

Preliminary Remediation Goals (PRGs): The long-term goal for contaminant media concentration levels selected for long-term targets during the analysis and selection of remedial alternatives. PRGs are based on readily available information and are preliminary in nature.

Probabilistic Risk Assessment (PRA): A site-specific risk assessment performed using a statistical sampling technique that produces a probabilistic approximation of the potential risk from the site-specific risk assessment algorithm or model.

Prospective Purchaser Agreement (PPA): An agreement between the U.S. EPA and the prospective buyer of a Superfund site that protects the prospective buyer from certain liabilities for contamination that is already on the site, usually in exchange for a payment of money and other commitments by the prospective purchaser. States may also have similar agreements as part of their voluntary cleanup or brownfields programs.

Pump and Treat (P&T): A generic cleanup technology where contaminated groundwater is pumped from the ground and run through a treatment system before being discharged.

Quality Assurance Project Plan (QAPP): A document, or set of documents, that integrates all technical and quality aspects of a project including planning, implementation, and assessment. The purpose of the QAPP is to document planning results for environmental data operations and to provide a project-specific “blueprint” for obtaining the type and quality of environmental data needed for a specific decision or use.

Quality Assurance/Quality Control (QA/QC): Most commonly refers to a review conducted by laboratories of the procedures used in analyzing samples, conducted after the samples have been analyzed. The review is conducted to make sure that the samples were properly analyzed, and that the sample results are accurate.

Quantitation Limit: The lowest concentration for an analytical test method and sample matrix at which the quantity of a particular substance can be routinely measured with a stated degree of confidence. The quantitation limit for a particular sample analysis and analytical method is called the sample quantitation limit (SQL) or reporting limit.

Receptor: Environmental resources, including but not limited to, plant and animal species, humans, sensitive environments and habitats, water supply wells, and locations that have the potential to be, or have actually been, exposed to contamination.

Recognized Environmental Condition (REC): As defined under the ASTM E 1527 Standard, the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be de minimis are not recognized environmental conditions.

Recommended Cleanup Levels (RCLs): Screening criteria or cleanup levels selected for a site that can be applied to solid waste, affected soil, sediment, and other environmental media.

Record of Decision (ROD): Documents the regulators' decision for the selected remedial action, and includes the responsiveness summary and a bibliography of documents that were used to reach the remedial decision. When the ROD is finalized, remedial design and construction can begin.

Reference Concentration (RfC): A value representing a daily exposure level for the human population, including sensitive subpopulations, that is not likely to cause deleterious and non-reversible adverse non-cancer health effects during a chronic or sub-chronic exposure period.

Reference Dose (RfD): A value representing a daily exposure level for the human population, including sensitive subpopulations, that is not likely to cause deleterious and non-reversible adverse non-cancer health effects during a chronic or sub-chronic exposure period.

Region VIII: Refers to the U.S. EPA's Region 8, which covers the states of Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

Regulatory Re-Opener: A clause in a No Further Action letter or other cleanup agreement that states that the regulatory agency may “reopen” a site for further investigation or cleanup if a certain event occurs, such as the discovery of additional contamination or the failure of an institutional or engineering control.

Remedial Action (RA): The actual construction or implementation phase of a Superfund site cleanup that follows remedial design.

Remedial Alternative Evaluation (RAE): An evaluation of potential remedial alternatives that might be employed to clean up a site. The magnitude of the alternatives comparison process will depend on the site of the impacts and potential cost for remediation.

Remedial Design (RD): A phase of remedial action that follows the remedial investigation/feasibility study and includes development of engineering drawings and specifications for a site cleanup.

Remedial Investigation (RI): An in-depth study designed to gather data needed to determine the nature and extent of contamination at a site. This document also typically establishes site cleanup criteria, identifies preliminary alternatives for remedial action, and supports technical and cost analyses of alternatives. The remedial investigation is usually done with the feasibility study, which together, are usually referred to as the “RI/FS.”

Remedial Response: Long-term action that stops or substantially reduces a release or threat of a release of hazardous substances that is serious but not an immediate threat to public health.

Remediation: An action involving cleanup, mitigation, correction, abatement, minimization, elimination, control, treatment, removal, or to implement institutional and/or engineering controls to prevent the spreading, migration, leaking, leaching, volatilization, spilling, transport, exposure, or further release of a contaminant to the environment to protect public health or the environment.

Remediation Goal (RG): The target cleanup level or objective that is cost-effective, implementable, and protective of human health and the environment. The RG can be quantitative (e.g., a numerical cleanup level) or can be qualitative (e.g., basis for an engineered barrier, to prevent/minimize exposure).

Removal Action: A cleanup action taken during the initial investigation of a site before the Record of Decision has been signed. Also known as an Interim Removal Action Measure (IRAM). Removal Actions typically are simple cleanups, using proven technologies to quickly reduce obvious threats posed by contamination at a site. For example, removing leaking drums from a site or installing a water treatment system on a contaminated drinking water well.

Representations and Warranties: Statements of fact (representations) and promises (warranties) that a seller makes to a buyer in a real estate transaction.

Residential Use Standard: A cleanup standard, usually expressed as a numerical ratio of parts of a specific contaminant to parts of the medium of concern (e.g., 5 parts of lead per million parts of soil) that describes the contaminant's maximum concentration in the medium that will not present an unacceptable risk to the health of humans residing on the site, or engaging in activities on the site that are considered to be substantially similar to residing on the site. The residential use standard is usually the strictest cleanup standard, and a site that meets this standard can usually be used for any purpose.

Residual Contamination: Contamination that remains at a site after cleanup has been completed. Contaminants may be left behind at a site if the concentrations are too low to cause harm, or if it is not cost-effective to remove all of the contaminants.

Residual Land Value (RLV): Determined by evaluating the value of a fully developed real estate project and then subtracting out the costs of construction, financing, marketing, and an allocated cost for risk, among others, that affect the cost of the property. As a result of this analysis, a property value will emerge that a willing and able buyer would pay for a given land-use given the current real estate market conditions.

Residual Risk Assessment: A risk assessment that looks at the risks posed by residual contamination that remains at the site following cleanup.

Resource Conservation and Recovery Act (RCRA): (pronounced "rick-rah.") A federal law that regulates the generation, transportation, treatment, storage, and disposal of hazardous wastes. RCRA's Corrective Action authority partially overlaps with the Superfund cleanup law.

Responsible Party (RP): A person or company who is legally responsible for contamination at a site. The party is responsible for paying for the investigation and cleanup of the site, and paying for any natural resource damages caused by the contamination.

Restrictive Covenant: A specific type of deed restriction. For example, a restrictive covenant could prohibit commercial uses.

Risk: The likelihood or probability that a hazardous substance, when released to the environment, will cause adverse effects in exposed humans or other biological receptors. Risk is further classified as carcinogenic (from exposure to carcinogens) or noncarcinogenic (from exposure to non-carcinogens).

Risk Assessment (RA): Qualitative and quantitative evaluation and determination of the risks to human health and the environment posed by contamination at a site. Risks are calculated using exposure factors, which provide numerical values for "exposures," such as ingestion of arsenic or inhalation of benzene. Risk Assessments may be conducted before or after site cleanup occurs; may look at risks to people and other biological receptors; and may calculate risk as a specific value (point estimate) or a range of values (distribution).

Risk-Based Concentrations (RBCs): A numerically defined concentration of a constituent of concern that is based on a regulatory-established concentration level that can increase the risk of getting cancer.

Risk-Based Corrective Action (RBCA): (pronounced “Rebecca”) Establishes requirements to create a risk-based approach for assessment and cleanup of discharges and releases from contaminated sites. Requirements include methods and procedures for identifying the contaminant’s source, determining the nature and extent of contamination, characterizing the risk posed to people and other biological receptors, and performing corrective action to reduce the contaminant’s levels.

Risk Characterization: An assessment used to calculate carcinogenic risk levels and hazard indices for a site. This is accomplished quantitatively by calculating Hazard Quotients, which are ratios between the exposure point concentrations and the toxicity reference values (TRVs) for particular chemical and their effect on representative species.

Sampling and Analysis Plan: A written plan that describes the equipment and methods to collect samples of air, soil, groundwater, surface water, and/or sediments at a site. This plan describes how many samples will be collected, where the samples will be collected, and how the samples will be analyzed to detect hazardous substances.

Semi-Volatile Organic Compounds (SVOCs): Compounds that have a moderate to low solubility in water and do not readily evaporate into air. Common SVOCs include constituents found in asphalt and heavy fuel oil (e.g., pyrenes, chrysene, anthracenes, and fluoranthenes).

Site Characterization Report (SCR): A document that provides information supporting the delineation of the vertical and horizontal extent of site contamination. The SCR document is typically used in support of developing site-specific remedial requirements, if applicable.

Site Management Plan (SMP): A document that defines appropriate site management activities (e.g., environmental monitoring, deed notations, site security, or post-closure care) as determined on a case-by-case basis. The site management plan may contain a “No Further Action” option only if the level of risk present is below set regulatory criteria. Upon completion of all activities documented in a Cleanup/Management Report, the regulatory agency typically issues a “Certification of Completion,” stating that the site has been managed in accordance with the specifications in the approved Site Management Plan.

Soil Vapor Extraction (SVE): A treatment technology that removes vapors from air spaces in contaminated soil by setting up a pressure gradient or vacuum. SVE technology is often used in conjunction with air sparging (the injection of air into the ground) to address contamination of volatile organic compounds in both soil and groundwater.

Standard Operating Procedures (SOP): A streamlined approach in which exposure and risk assessment practices are integrated with traditional components of the corrective action process. The approach ensures that appropriate and cost-effective remedies are selected and that limited resources are properly allocated.

Structured Risk Transfer Program: An insurance program (informally referred to as a “finite” program) that combines traditional and alternative risk financing

components. This program shifts the financial responsibilities associated with either known or unknown environmental liabilities to an insurance carrier, which in turn, pays all applicable associated costs as defined in the policy on behalf of the client.

Superfund: The better-known name for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) passed by Congress in 1980. Under this law, parties found responsible for polluting a site must clean-up the contamination or reimburse the U.S. EPA for doing so. Liability is strict, retroactive, joint and several. The Superfund also established the National Priorities List (NPL), investigates sites for inclusion on the list, determines their priority, and conducts and/or supervises cleanup and other remedial actions at these sites.

Superfund Amendments and Reauthorization Act (SARA): The 1986 Act reauthorizing and amending the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). SARA includes the Emergency Planning and Community Right to Know Act of 1986 and the Radon Gas and Indoor Air Quality Act of 1986. It encourages and supports local and state emergency planning efforts to provide citizens and local governments with information about potential chemical hazards in their communities.

Targeted Brownfields Assessments (TBA): A U.S. EPA regional program aimed at helping municipalities redevelop contaminated sites in their community.

Tax Increment Financing (TIF): The local taxing entity gives to the owner the increase in property tax value (incremental value) that a property creates as it is redeveloped. As the property is redeveloped, its assessed value is increased, leading to an increase in the tax base. This increase, or a portion thereof, is rebated by the taxing entities to the property owner or developer.

Technical Impracticability: A situation where achieving certain remediation requirements is impracticable based on engineering feasibility and reliability, cost-effectiveness, and risk-based considerations.

Total Petroleum Hydrocarbons (TPH): A measurement of a laboratory sample's total amount of hydrocarbons. This is generally used when sampling for petroleum products (e.g., heating oil, gasoline, kerosene, asphalt, etc.).

Toxic Substance: A chemical or mixture that may present an unreasonable risk of injury to health or the environment.

Toxic Substances Control Act (TSCA): Enacted by Congress in 1976 to give U.S. EPA the ability to track the approximately 75,000 industrial chemicals currently produced or imported into the United States. TSCA is intended to protect human health and the environment from unreasonable risks of certain chemicals. For example, under TSCA, any hazardous waste that contains more than 50 parts per million of polychlorinated biphenyls (PCBs) is subject to regulation.

Toxic Tort Action: A legal proceeding brought to seek damages for personal injury or property damage incurred as a result of exposure to a hazardous substance.

Toxicity Assessment: The process of defining the nature of injuries that may be caused to an organism by exposure to a given chemical as well as the exposure

concentration and time dependence of the chemically induced injuries. The assessment's aim is to establish safe exposure concentration limits in relation to possible time of exposure.

Toxicity Reference Value (TRV): An integral component of an ecological risk assessment as a quantitative measurement of the chemical's toxicity to the animals of concern. TRVs intend to facilitate selection of a cleanup action by developing the information needed to evaluate cleanup action alternatives in the feasibility study.

Treatability Study: The testing and documentation activities to evaluate the effectiveness of a proposed remediation method (remedial action) prior to full-scale design and implementation. Treatability studies includes, but are not limited to, bench scale studies and pilot scale studies. A Corrective Action Plan may require a treatability study if the remediation method has not been evaluated by the U.S. EPA (or an independent consultant or trade association) to be capable of treating the site's medium (or medium of similar physical and chemical characteristics).

Underground Storage Tank (UST): A tank (and any underground piping connected to the tank) that has 10 percent or more of its volume (including pipe volume) beneath the ground's surface. "Underground storage tank" does not include structures such as sumps, separators, storm drains, catch basins, oil field gathering lines, refinery pipelines, lagoons, evaporation ponds, well cellars, separation sumps, lined and unlined pits, and lagoons.

U.S. Environmental Protection Agency (U.S. EPA): A federal agency created in 1970 to permit coordinated and effective governmental action for the environment's protection by the systematic abatement and control of pollution through integration of research monitoring, standard setting, and enforcement activities. The U.S. EPA influences U.S. and global policies concerning environmental and natural resources, as they pertain to human health, economic growth, energy, transportation, agriculture, industry, and international trade.

Utah Department of Environmental Quality (UDEQ): Supports implementation of state and federal environmental laws, rules and regulations, and maintains state primacy for implementing federal programs. UDEQ also implements community affairs and outreach programs, provides technical and policy recommendations to the governor and legislature, and coordinates Department programs with local health departments and others.

Volatile Organic Compounds (VOCs): Compounds that have a high vapor pressure and low water solubility. VOCs readily produce vapors. Common VOCs include constituents found in gasoline (e.g., benzene and MTBE) and various solvents (e.g., toluene, xylenes, tetrachloroethylene [TCE], and perchloroethylene [PCE, a common dry cleaning agent]).

Voluntary Cleanup Program (VCP): Cleanups of identified contamination that are not ordered by a court or regulatory agency. Most states have voluntary cleanup programs that encourage voluntary cleanups and that may provide benefits if volunteers meet specified standards.

Wetlands: Those areas where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation. These areas also have soils indicative of wet (hydrid) conditions.

Windfall Lien: Unrecovered response costs spent on the Bona Fide Prospective Purchaser's land if the response action increases the land's fair market value. Windfall liens are generally limited to the lesser of the amount of unrecovered response costs or the increase in the property's fair market value attributable to the response action. Windfall liens arise at the time costs are first incurred.

Work Plan: A detailed plan, written by a contractor and typically approved by a regulatory authority (unless the cleanup is voluntary), that delineates when and how the remediation contractor will conduct an investigative or cleanup action. Work Plans typically include a detailed description of the proposed remedial activities, a Health & Safety Plan, a Sampling & Analysis Plan, and a detailed schedule of all activities.