

Environmental Transactions and Brownfields Committee Newsletter

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POTENTIAL PITFALLS IN ENVIRONMENTAL DUE DILIGENCE

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Allocation of environmental liabilities is often one of the primary areas of focus in a real estate transaction or corporate acquisition. Significant environmental liabilities may be imposed upon an unsuspecting or unsophisticated buyer if adequate inquiries are not made. To avoid assumption of undesired environmental liabilities, a buyer must conduct appropriate due diligence. Environmental due diligence, which may include conducting an environmental site assessment, review of agency and company files, and inquiry into other potential areas of liability, such as off-site disposal of the seller's waste materials, generally is a straight-forward process. However, an environmental practitioner must take great care to avoid falling into the potential due diligence traps for the unwary.

Trap No. 1: Reviewing Only Select Environmental Laws

In acquiring real estate, buyers need to be cognizant that environmental liabilities can be imposed upon owners and operators of contaminated property. In a corporate acquisition, a buyer needs to be concerned about on-site liabilities, such as soil and groundwater contamination and non-compliance of the operations with environmental laws. A buyer may also need to be

concerned about off-site liabilities, since the purchase of the stock of an existing business (or in some cases even the assets thereof) will likely cause the buyer to become a successor corporation under the law and therefore become liable for not only the predecessor's on-site liabilities but its off-site liabilities as well. Therefore, it is critical to have an understanding of the primary statutes imposing liability and remedial obligations upon owners and operators of businesses and real property.

Most environmental practitioners consider the potential application of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601 *et seq.*, the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 *et seq.*, the Clean Water Act (CWA), 33 U.S.C. § 1251 *et seq.*, the Clean Air Act (CAA), 42 U.S.C. § 7401 *et seq.*, and the Toxic Substances Control Act (TSCA), 15 U.S.C. 2601 *et seq.* (collectively the "Fab 5") in conducting due diligence. However, in corporate acquisitions, some practitioners overlook the potential application of the Occupational Safety and Health Act, 29 U.S.C. § 651 *et seq.*, and relevant state health and safety laws and regulations. Depending on the business, health and safety violations, including process safety management and facility siting issues, could potentially result in significant liabilities to the buyer post-closing. Consequently, care should be taken to consider all potentially relevant environmental laws and regulations as part of the due diligence process, not just the Fab 5.

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Trap No. 2: Failing to Make Due Diligence Specific to the Transaction

Environmental liabilities may generally result from one or more of the following: (1) costs associated with remediation of on-site problems such as spills, releases, or disposal of wastes; (2) property damages or personal injury actions; (3) penalties that may accrue due to lack of compliance with environmental laws; and (4) costs associated with contribution or cost recovery action arising out of the off-site disposal of wastes generated by the seller. In a raw land purchase, a buyer likely will only be concerned with (1). In an asset acquisition, a buyer will be concerned with (1), (2), and (3), particularly if the conditions causing those liabilities will continue after closing. In a stock acquisition or merger, a buyer will be concerned with all four types of environmental liabilities, including those arising out of events that occurred wholly before closing.

Because the environmental liabilities potentially transferred to a buyer vary based on the type of transaction (i.e., raw land purchase, asset acquisition, stock acquisition, merger), due diligence should be made specific to the transaction contemplated by the buyer. Environmental practitioners need to examine the unique circumstances of each particular transaction to ensure that all potential significant environmental concerns are addressed.

Trap No. 3: Hiring the Lowest Bidder

Generally, environmental due diligence inquiries focus on two broad areas: environmental liabilities and compliance with environmental laws. The primary mechanisms for identifying compliance issues and environmental liabilities are due diligence inquiries to the seller and environmental site assessments. Often an environmental consulting firm is retained by the buyer to assist in due diligence inquiries. The environmental consultant may be engaged to: (1) conduct an audit of the facilities to be purchased to assist in identifying compliance issues and potential on-site and off-site liabilities, and/or (2) to conduct Phase I and Phase II Environmental Site Assessments of the properties to be acquired.

Environmental practitioners should assist in selecting a reputable environmental consulting firm. Buyers can be tempted to choose the lowest bidder to perform the due diligence. However, the lowest bidder is not always the most qualified environmental consulting firm, and usually you get what you pay for. Because of the importance of environmental due diligence, a buyer must hire a good environmental consultant.

After an environmental consulting firm has been selected, the environmental practitioner should carefully review the consultant's contract, particularly the indemnity and insurance provisions, before the buyer signs it. The buyer's interests should be protected if the actions of the consultant result in injury to persons or property. In addition, environmental practitioners should assist in delineating the scope of the compliance audit and environmental assessments. An environmental consulting firm, without the supervision of an experienced environmental attorney, may not be able to recognize all of the potential legal liabilities arising out of the contemplated transaction.

Trap No. 4: Not Reviewing Leases

In many transactions, the assets to be acquired are located on leased property. Real estate documents, including leases, are normally reviewed by real estate attorneys as part of due diligence. However, leases should also be reviewed by environmental practitioners. Although well-versed in real estate law, real estate attorneys may not have the environmental expertise to properly assess the potential environmental liabilities to a buyer arising out of the lease.

Some leases contain provisions that require the lessee to restore the property to "pre-lease" conditions at the end of the lease term, which may result in significant environmental liabilities being transferred to the buyer after closing. In addition, leases sometimes contain prohibitions on the types of activities that may take place on the leased property. The environmental practitioner should confirm that the buyer's intended use of the leased property is allowed under the lease.

Trap No. 5: Not Allowing Sufficient Time for Due Diligence

One of the most common pitfalls in transactions is not allowing sufficient time for environmental due diligence prior to closing. Phase I environmental site assessments and compliance audits generally take three to four weeks to complete. Phase II environmental site assessments can take six weeks or more depending on the scope of the investigation. Therefore, in an ideal world, the environmental practitioner would have at least ninety days between signing and closing to conduct environmental due diligence. Additional time will also be needed if the buyer plans to obtain environmental insurance as part of the transaction. In some states, such as New Jersey, additional time will also be required to comply with state laws applicable to the transfer of industrial property. *See, e.g.,* New Jersey Industrial Site Recovery Act, N.J. STAT. ANN. § 13:1K-6 et seq.

Conclusion

Environmental due diligence is an art, not a science (although science is certainly involved). By avoiding the potential pitfalls discussed above, an environmental practitioner can conduct due diligence in a manner that will protect the buyer from unwanted and unexpected environmental liabilities.

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The Environmental Transactions and Brownfields Committee welcomes the participation of members who are interested in preparing this newsletter.

If you would like to lend a hand by writing, editing, identifying authors, or identifying issues, please contact the one of the editors: Thomas R. Doyle at tdoyle@pierceatwood.com or Robert R. Gelblum at rob.gelblum@ncmail.net.

PUBLIC-PRIVATE PARTNERSHIPS: A KEY ELEMENT FOR A SUCCESSFUL BROWNFIELDS PROJECT

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As a practical matter, real estate projects that involve contaminated property, seek to reuse former industrial or transportation sites, or involve development of urban infill sites rarely succeed without a partnership between private and public entities. “Brownfields” projects like these are notable for the differing and often conflicting views of public and private stakeholders. A public-private partnership model is often the most effective approach to accommodate different viewpoints and resolve conflicts among them.

Models of public-private partnerships are widely discussed. The United States Environmental Protection Agency (EPA) addresses principles of such models in its guidance documents. *See, e.g.*, Characteristics of Sustainable Brownfields Projects (EPA 500-R-98-001, July 1998). Guidance for specific brownfields scenarios describes partnership models and principles that have particular relevance to those scenarios. Examples include: the EPA Brownfields and Land Revitalization Technology Support Center’s “Mine Site Cleanup For Brownfields Redevelopment: A Three Part Primer” (EPA 542-R-05-030, Nov. 2005), and EPA’s “Successful Rail Property Cleanup and Redevelopment: Lessons Learned and Guidance to Get Your Railfields Projects on Track” (EPA-560-F-05-231, Aug. 2005). Information on public-private partnership models is also available in connection with government initiatives such as EPA’s Return To Reuse and the Brownfields Federal Partnership Mine-Scarred Lands Initiative. *See, e.g.*, “Mine-Scarred Lands Revitalization: Models Through Partnerships” (EPA-560-R-003, Sept./Oct. 2005). In addition, the Urban Land Institute’s “Ten Principles for Successful Public-Private Partnerships” (2005) identifies some characteristics to consider when structuring a model for a particular project.

For any public-private partnership model, it is essential that the project developer start by identifying all of the

public and private stakeholders. This group will include all government entities that have permitting or other authority over any aspect of the project. It will also include neighboring property owners. Depending upon the project, it may include community or public interest groups. Anyone who potentially can delay or block the project should be identified as a stakeholder early on.

Once the stakeholders are identified, the foundation for a successful partnership begins with a serious effort by all stakeholders to listen to the other stakeholders. The project developer usually needs to facilitate this effort. The process can start with individual meetings or other communications between the developer and each other stakeholder, but at some point all of the stakeholders need to meet as a group. Each stakeholder needs to understand and acknowledge the other stakeholders’ goals and concerns as well as their abilities and limitations.

This process of stakeholder education is not as difficult as it may first appear. Several goals that typically arise for brownfields projects will be shared by multiple stakeholders. For example, multiple public and private stakeholders will want to ensure that the project is protective of public health and the environment. These stakeholders will, however, differ on the means to achieve the shared goal. Some will seek cleanup to the most stringent levels; others will seek to limit exposure by means of engineered solutions or deed restrictions. Multiple stakeholders will also share the same concerns. For example, the private developer and the government stakeholders will all share a concern about future funding of operation and maintenance of any public feature of the proposed project, but, because of limitations on their abilities, they each have a goal of shifting that obligation to someone else. Similarly, all stakeholders (at least in theory) understand that the private developer needs to complete the project at a reasonable cost and obtain a fair return on its investment. Nonetheless, the other stakeholders may need to be sensitized to the impact of delays and their attendant costs on the developer’s ability to achieve those goals. These initial dialogues among stakeholders provide the private developer with an opportunity to educate the other stakeholders regarding such issues.

Once stakeholders' goals, concerns, abilities, and limitations are understood and acknowledged, the next critical step in the partnership process is to reach an agreement on a concept or vision for the project which responds to the most important stakeholder issues in a fair and equitable manner. Having a shared concept or vision is necessary for the stakeholders to collaborate effectively as the project moves forward. Essentially, the stakeholders must build a consensus in support of a specific vision or concept. To do this, they must resolve their competing demands and expectations at the outset rather than continue to argue about them at each stage of the project. Because brownfields projects can take a long time to complete, the shared concept or vision must be more than the whim of current public officials or community leaders. It must represent a concept with broad public support; in other words, a vision that will stand the test of time. And finally, even though circumstances may change over the life of a brownfields project, both public and private stakeholders need to keep the fundamental bargain that they struck at the outset.

Building stakeholder consensus on a specific project vision takes time. However, that time is well-spent. Having this consensus will reduce the number and length of delays at other stages of the project because stakeholders no longer can treat each decision point as a time to press their individual points of view.

To reach this shared vision, the private developer may need to change aspects of its ideal project so that the public entities, whether government agencies or community groups, perceive the project as beneficial and protective. And the government agencies and community groups must agree to a project that provides the private developer with a fair profit. This also means, for those projects which contemplate an area of public use, such as a park or open space, that a public entity needs to accept at least some responsibility for ongoing management of that area and funding of its operation and maintenance. In other words, the public entity cannot rely on the private developer to bear the entire cost of that park forever.

In addition to a shared project vision, a realistic and unambiguous process to implement that vision is one of

the most important aspects of a successful public-private partnership. After the stakeholders agree upon the shared vision, they next need to agree upon a project road map that identifies the steps required to implement their vision and a timeline for doing so. The best road maps include reasonable schedules for submission of and action on deliverables. It is also important to identify clear measures of performance for the developer and the reviewing agencies. A good road map will also include routes to avoid bottlenecks and mechanisms for dispute resolution.

To ensure that the partnership continues to function well, the stakeholders must commit to frequent and regular communications with one another. This means that at the outset they identify and agree upon the types of project materials to be distributed to all or one or more subsets of stakeholders. One stakeholder needs to assume the responsibility to prepare and maintain a distribution list or lists. Often, the task of distributing materials and maintaining the distribution list falls to the private developer. The stakeholders must also schedule regular times to share information and discuss the project. These communications can be telephone conferences or, at key stages of the project, site meetings. Frequency of communications may increase at particularly active or controversial phases of the project.

Designation of a leader or decision-maker by each stakeholder can be very valuable. Ideally, the persons selected as leaders will be people of sufficient stature in each group that he/she is able to keep the group together, control or at least influence the group's actions, and speak with authority on behalf of the group. Regular communication and coordination among the leaders helps to build trust, avoid misunderstandings, and keep the project moving forward.

Often, as a brownfields project proceeds, the unexpected happens. Field work may, for example, reveal contamination in an unexpected location or sampling results show that contamination is more severe than expected. Or changes in the scientific assumptions underlying risk assessments may lead to a more stringent cleanup goal. In each instance, this

unexpected development could terminate or at least delay the project. Having a public-private partnership in place provides a structure in which the stakeholders can address these unexpected developments. Absent such a partnership, the unexpected development could lead to endless debate as stakeholders try to find fault or avoid criticism, all to the detriment of the project. With a strong public-private partnership, it is easier for the stakeholders to find a solution, thus saving time and resources and possibly the project.

SUPREME COURT TO CONSIDER CERCLA SECTION 107 CONTRIBUTION

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On Jan. 19, 2007 the United States Supreme Court signaled an intention to further clarify the scope of private parties' right to seek contribution under Section 107(a) of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (42 U.S.C. §9607(a).) Specifically, the Court agreed to hear an appeal from a decision of the United States Court of Appeals for the Eighth Circuit in *Atlantic Research Corp. v. United States of America*, 459 F.3d 827 (8th Cir. 2006), which concluded that CERCLA Section 107(a)'s "cost recovery" provisions permit a potentially responsible party (PRP) to recover from another PRP remedial costs in excess of the Section 107(a) claimant's *pro rata* share of costs incurred in remedying contamination at a CERCLA site. The *Atlantic Research* holding, like earlier Second Circuit authority, represents a response by some federal circuit courts to the strict interpretation of CERCLA contribution rights enunciated in the Supreme Court's landmark 2003 ruling in *Cooper Industries, Inc. v. Aviall Services, Inc.*, 543 U.S. 157 (2004).

The Supreme Court's *Cooper* ruling limited responsible parties' rights to seek contribution under CERCLA Section 113(f)(1) (42 U.S.C. § 9613(f)(1)). In an opinion penned by Justice Clarence Thomas, the *Cooper* Court held that a PRP may *only* obtain Section 113(f)(1) contribution, *if* the Section 113 contribution suit was initiated "during or following any civil action" against the PRP for cost recovery under CERCLA Sections 106 (42 U.S.C. § 9606) or 107(a) (42 U.S.C. 9607(a)). Under CERCLA Section 113(f)(1), a qualifying "responsible party" entitled to contribution may recover from other PRPs response costs in excess of the Section 113 claimant's *pro rata* share of response costs.

The Supreme Court's *Cooper* decision was silent as to whether a PRP who had not been sued in a cost recovery suit under Section 106 or 107(a) could still maintain a suit under CERCLA Section 107(a) for "contribution" (i.e., response costs in excess of the responsible party's *pro rata* share of response costs). CERCLA Section 107(a) has historically been applied exclusively to afford an "innocent party" (i.e., one able to establish a complete defense to CERCLA liability) with an opportunity to seek "cost recovery" (i.e., recovery of the *entire* amount of costs incurred in responding to a CERCLA site). *See, e.g. Bedford Affiliates v. Sills*, 156 F.3d 416 (2d Cir. 1998), and *Dico, Inc. v. Amoco Oil Co.*, 340 F.3d 525 (8th Cir. 2003).

The terms of CERCLA Section 107(a)(4)(B) permit private recovery of "any other necessary costs of response . . . consistent with the national contingency plan." CERCLA Section 107(a), unlike Section 113(f) as applied in *Cooper*, allows a responsible party to seek recovery *regardless* of whether the responsible party has been sued in a Section 106 or Section 107(a) cost recovery action.

The *Cooper* holding generated criticism on grounds that limiting Section 113(f) contribution to those instances in which the PRP had been sued in a CERCLA Section 106 or 107(a) suit discourages voluntary cleanup. Critics pointed out that any PRP contemplating voluntary cleanup would be unable under *Cooper* to seek contribution under Section 113(f) until *after* the government or private claimants had sued the Section 113 claimant under CERCLA Sec. 106 or 107(a). Thus a PRP contemplating cleanup may elect to delay cleanup until *after* it is sued under Sec. 106 or 107(a), so as to ensure that it had a legal means of seeking contribution for the remedial costs it expends. This disincentive to voluntary remediation was said to conflict with CERCLA's remedial purpose, and with the twin goals of facilitating timely cleanup of hazardous waste sites and imposing cleanup costs upon responsible parties (i.e., those who owned or operated the site, generated the wastes or arranged for transportation of wastes to the site).

Following *Cooper*, some courts sought to compensate for the restriction of Section 113(f)(1) contribution rights by recognizing a right of contribution under CERCLA Section 107(a)'s "cost recovery" provisions. CERCLA Section 107(a)(4)(B) states that a private party may recover "any other necessary costs of response . . . consistent with the national contingency plan." Some PRPs argued post-*Cooper* that Section 107(a) should be construed to afford a contribution right (i.e., the right to recover remedial costs in excess of the PRP's *pro rata* cost share) for voluntarily-incurred remedial costs incurred (i.e., costs incurred without a Section 106 or Section 107(a) suit), regardless of whether the PRP was "innocent."

The Second Circuit was among the first federal appellate courts post-*Cooper* to tackle whether Section 107(a) allows a "contribution" claim for voluntary remediation costs. In *Consolidated Edison Co. v. UGI Utilities, Inc.*, 423 F.3d 90 (2d Cir. 2005) (*Con Ed*), the Second Circuit concluded that a PRP that had voluntarily remediated a CERCLA site pursuant to a "Voluntary Cleanup Agreement" with the State of New York could recover in contribution under Section 107(a) for response costs incurred in excess of its *pro rata* share. 423 F.3d 90 at 100. In so ruling, the *Con Ed* court acknowledged that the PRP there was barred under *Cooper* from pursuing a Section 113(f)(1) contribution action, as the PRP had not yet been sued pursuant to Sections 106 or 107(a). (On April 14, 2006, UGI Utilities, Inc. filed a petition for *certiorari* to the U.S. Supreme Court regarding the Second Circuit's *Con Ed* ruling. On Oct. 2, 2006, the Supreme Court invited the United States solicitor general to file a brief in the case. UGI's petition for *certiorari* is still pending.)

More recently, the Eighth Circuit in *Atlantic Research Crop. v. United States of America*, 459 F.3d 827 (8th Cir., 2006) (*Atlantic Research*), also addressed the question whether a potentially responsible party may obtain contribution as to amounts advanced beyond its equitable share, from another liable party under Section 107(a). 459 F.3d at 834. The *Atlantic Research* Court, like *ConEd* Court, concluded that Section 107(a) permits a *contribution* action, holding:

Section 107(a) is not limited to parties seeking to recover 100% of their costs. To the contrary, the text of Section 107(a)(4)(B) permits recovery of “any other necessary costs of response . . . consistent with the national contingency plan.” While these words may “suggest full recovery,” they do not compel it. CERCLA, itself, checks overreaching liable parties: If a plaintiff attempted to use Section 107 to recover more than its fair share of reimbursement, a defendant would be free to counterclaim for contribution under Section 113(f)(1). Accordingly, we find that allowing Atlantic’s claim for direct recovery under Section 107 is entirely consistent with the text and purpose of CERCLA.

Id. at 835 (internal citations omitted).

The United States sought review of the Eighth Circuit’s *Atlantic Research* holding by filing a writ of *certiorari*, arguing that CERCLA Section 107 does not permit a person who is not an “innocent” PRP to sue another PRP for contribution. The United States further argues that Section 113(f)(1) is the exclusive mechanism under CERCLA whereby a PRP can sue another PRP for contribution, and that—under *Cooper*—Section 113(f)(1) contribution is not available unless the Section 113(f)(1) claimant is itself the subject of a cost recovery action under Section 106 or 107(a).

At this stage, the basis for the Supreme Court’s determination to accept the *Atlantic Research* holding for review is a matter of speculation. One theory would hold that the Eighth Circuit has gone too far in allowing contribution actions under CERCLA’s Section 107(a) “cost recovery” provisions, in an effort to counteract dis-incentives—recognized post-*Cooper*—for PRPs to delay voluntary remedial actions until the United States or others initiate actions under Section 106 or Section 107(a). Alternatively, the Supreme Court may see in *Atlantic Research* an opportunity to apply to Section 107(a) the strict-constructionist philosophy evidenced in the *Cooper* Court’s construction of Section 113(f)(1).

The Supreme Court may issue a ruling in the *Atlantic Research* case before the summer recess at the end of

June 2007. The Court’s consideration of *Atlantic Research* will be closely watched as a major step in the ongoing process of applying CERCLA’s complex and inter-dependent cost recovery and contribution provisions, consistent with the Congressional intent behind the statute.

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PERCHLORATE CONTAMINATION: A GROWING CONCERN IN BROWNFIELDS TRANSACTIONS

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One of the most critical calculations in the buying, selling, or developing of brownfields properties is the assessment by all parties of the risks associated with the property. Parties involved in brownfields transactions confront the fear of the unknown or undiscovered contaminant surfacing, sometimes literally, and leading to the disruption of the plans for the property. Environmental concerns associated with some contaminants, like chlorinated solvents, have been known for years, and the risks associated with those contaminants can be estimated. More troubling are the “emerging” contaminants, materials which were previously thought not to be of concern, or which analytical testing had difficulty detecting. Thus, sites that may have been considered successfully remediated years ago may become of renewed concern when testing identifies a previously undiscovered contaminant.

Recent developments regarding the material perchlorate highlight the problems of emerging contaminants. Perchlorate, a salt compound, came into widespread use in the United States during the Second

World War, and is a component of solid rocket fuel, missile fuel, pyrotechnics, road flares, explosives, and ordinance. For decades, perchlorate was viewed as a benign substance, and as a result, there were no significant restrictions on its discharge. Perchlorate containing materials were often rinsed into retention ponds or directly into the soil. Perchlorate is highly soluble, and in many instances, the routine handling practices associated with the chemical allowed it to easily migrate to groundwater.

Early analytical tests had difficulty detecting perchlorate in groundwater at levels below 400 parts per billion (ppb), and as a result, perchlorate in groundwater went largely undetected. In the late 1990s, more sensitive testing allowed detection to a level of 4 ppb, and it became apparent that perchlorate was widespread in groundwater and water supplies. In the state of California alone, perchlorate has been detected in over 300 water sources. According to the Environmental Protection Agency (EPA), as of 2005, perchlorate had been detected in public water supplies in more than twenty-five states.

Increasing detection of perchlorate was coupled with a growing concern about potential health effects of drinking perchlorate contaminated water or eating plants that contained perchlorate. Research suggests that perchlorate interferes with certain thyroid functions, but it is far from clear at what level perchlorate poses a health risk. Water providers who have discovered perchlorate in drinking water supplies have, in many cases, entirely removed the contaminated well or wells from use or substituted other water supplies. At a California site, a corporation that had manufactured signal flares provided bottled water to several hundred homes whose private wells were contaminated, even though there has been no final determination of what level of perchlorate is safe or unsafe. Not surprisingly, these developments have led to disputes and litigation over who bears responsibility for perchlorate problems; in many cases, the properties that are the source areas of the perchlorate are classic brownfields sites, that in some instances were redeveloped and remediated prior to the discovery of perchlorate.

Developers and others involved in brownfields contaminated with perchlorate face another difficult issue: the lack of a consistent standard for cleanup of perchlorate. Because perchlorate is extremely soluble, regulators and the regulated community have focused on setting a limit for perchlorate in groundwater. Proposals have ranged from 1 ppb, EPA's initial recommendation, to 200 ppb, suggested by various manufacturing and defense parties who have historically used the material. After lengthy review, EPA adopted a reference dose of 24.5 ppb in groundwater, but that number is a recommendation, not an enforceable standard. In April 2007, EPA issued a statement indicating that two contaminants, perchlorate and MTBE, require additional investigation before an enforceable standard can be proposed. The states have also wrestled with setting an appropriate standard; Massachusetts became the first to adopt a binding regulation and set the cleanup level at 1 ppb. California has a current suggested compliance level of 6 ppb, but is still in the process of establishing a binding and enforceable cleanup level. New Jersey is considering a 2 ppb limit. The difference between various cleanup levels can translate into very significant differences in cleanup time and costs and can lead to lengthy disputes between responsible parties and regulators.

All of this uncertainty is particularly burdensome to brownfields properties. First, how does the buyer or redeveloper of a brownfields property protect him or herself from the possibility that a previously unknown or unregulated material may someday be deemed to be a problem? Conversely, how does the seller of such a property minimize its risk of long term liability? Moreover, if a previously unregulated contaminant becomes of concern, how do the brownfields parties answer the question of "how clean is clean," when regulators and scientists struggle with the same question? Prudent buyers, sellers, and developers need to be aware of these types of issues as they consider the purchase and redevelopment of these properties, and as they undertake the financial and risk calculations underlying these transactions. Sellers need to be vigilant in including language that narrowly defines those environmental issues they will continue to be responsible for, while buyers need to be cognizant of

NANOTECHNOLOGY: A BIG DEAL

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the possibility of previously unsuspected problems cropping up either during or after the redevelopment process. Buyers will want to try to include language that allows them to turn to the seller for a relatively long period of time for any environmental issue associated with the property, including not merely undiscovered issues, but also contaminants that are not yet considered to be a threat. Parties may want to investigate insurance products and similar mechanisms designed to reduce long term risk, and those parties doing cleanups in state brownfields programs will want to include the broadest possible language protecting against future state action.

The perchlorate problem is not likely to be easily resolved, given the widespread extent of groundwater contamination and growing concerns about potential health threats. But perchlorate is far from unique: there are other “new” contaminants also receiving greater attention from regulators and the public. For example, EPA is paying greater attention to the possible health risks posed by perfluorochemicals (PFCs) which are manmade substances used in such applications as nonstick cookware. MTBE, a gasoline additive intended to promote clean air, has caused substantial health and environmental concerns as it is discovered in soil and groundwater throughout the country. There will be other, similar contaminants in the future which come as unpleasant surprises to members of the regulated community. Those parties engaged in transactions involving brownfields should be aware of the risk of such contaminants emerging in the future and take steps to inform and protect themselves against those risks whenever possible.

Nanotechnology’s small size makes it a big deal for our economy. Nanotechnology is common in our everyday lives, although most of us don’t know it. Cars, cosmetics, sports equipment, clothes, furniture, fuel, sunscreen, pharmaceuticals, and other everyday products contain nanomaterials. The new technology poses new challenges and issues for the business community. Addressing nanotechnology issues in real estate transactions requires new ways of thinking about traditional issues of liability, contracts, measuring chemical substances, risk management, and due diligence for transactions.

Let’s start with the basics. What is nanotechnology? Nanotechnology is the science of intentionally manipulating extremely small particles between 1 and 100 nanometers. How small is this? Very, very small. You can stretch 75,000 nanoparticles side by side within the width of one human hair. A virus is 7 nanometers wide. One nanometer is narrower than the width of a DNA strand.

So what’s the big deal about being small? At nanoscale sizes, the physical, biological, and chemical properties of materials behave very differently than similar conventional-sized materials. Nanomaterials can perform novel and unique functions due to their unique properties. Gravity does not affect these materials in the same way it affects other materials. The surface area of nanomaterials is enormous in proportion to conventional-sized materials. These unique properties enable nanomaterials to perform new functions.

What can nanomaterials do that is so unique? Nanotechnology improves fuel efficiency, drinking water treatment, sensors to detect weapons, electronic devices, and many other functions. Another example is health companies trying to use nanotechnology to cure cancer by 2015 through nanotechnology that will seek out cancer cells, enter the cells, and deliver a deadly dose of chemotherapy medicine that leaves healthy

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cells untouched. Researchers project that nanotechnology will be a \$1 trillion market in 2015. Lux Research Inc. recently projected that the nanotechnology sector will grow 74 percent by 2008.

One set of important issues regarding nanotechnology involves the environmental, health, and safety risks. In general, these risks are believed by many to be unknown and are hotly debated in some circles. Because nanoscale materials behave so differently than their conventional-sized counterparts, there are not many studies proving what their risks are. Moreover, the existing regulatory programs for environmental, health, and safety were not necessarily designed to cover nanoscale materials, leaving uncertainty as to whether these materials are regulated and, if so, how they are to be regulated. Another problem is that the instruments of measurement typically used in the environmental, health, and safety industry are not able to detect nanoscale materials. Very sophisticated equipment is needed, but is not readily available.

Research can take many years to perform. While we await what it will reveal about the health risks, the nanotechnology economy marches on, leaving businesses to provide traditional services for novel materials. How does one protect employees, workers, or adjacent tenants when the health risks are not known and one cannot readily detect the materials? Businesses must find ways to perform environmental due diligence with respect to real property where nanomaterials were present. How are nanomaterials to be measured when the traditional instruments cannot see them? How do you know what is there? Will nanomaterials create liability risk and how do you allocate the risk in a contract? Will a standard “comply with all laws” provision in a contract cover nanomaterials if the laws do not regulate nanomaterials in the same way that other conventional-sized chemical substances are regulated? These are but a few challenges the business community faces with nanotechnology. As usual, those with knowledge and creativity to adapt to changing business conditions will fare better than those who do not. Although small, nanotechnology is a big deal.

REAUTHORIZATION AND EXPANSION OF THE BROWNFIELDS TAX INCENTIVE: TAX RELIEF AND HEALTH CARE ACT OF 2006

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On Dec. 20, 2006, the Tax Relief and Health Care Act of 2006 extended the Brownfields Tax Incentive (Incentive) a fifth time. The Incentive allows deduction of “qualified environmental cleanup costs” in the year incurred or when taxes are paid. P.L. 109-432. “Qualified environmental cleanup costs” are costs “paid or incurred in connection with the abatement or control of hazardous substances at a qualified contaminated site.” P.L. 105-304 § 198(b)(1)(B). Qualified cleanup costs can include “site monitoring; cleanup costs; operation and maintenance costs; state voluntary cleanup program oversight fees; and removal of demolition debris.” *See* “Brownfields Tax Incentive Guidelines” at www.epa.gov/brownfields. Sites qualifying for the Incentive must meet two criteria. First, the site must be “held by the taxpayer for use in a trade or business or for the production of income.” P.L. 105-304 § 198(c)(1)(A)(i). These sites may include “trade or business property, investment property, or property held as inventory.” *See id.* However, qualified sites do not include “personal use property.” *Id.* Second, the site must be one “at or on which there has been a release (or threat of release) or disposal of any hazardous substance.” P.L. 105-304 § 198(c)(1)(A)(iii). Extension of the Incentive applies retroactively to include “expenditures paid or incurred after December 21, 2005.” P.L. 109-432.

The Incentive was originally enacted through passage of the Taxpayer Relief Act, which was signed by President Clinton on Aug. 5, 1997. Public Law 105-304. The Incentive originally applied to cleanup expenditures through 2000. As enacted in 1997, the Incentive applied only to: (i) qualified contaminated sites within (ii) targeted areas. Public Law 105-304. Qualified contaminated sites were defined as sites within a targeted area, at or on which there has been a release (or threat of release) or disposal of any hazardous substance. *Id.* Targeted areas were originally defined as high poverty areas and nearby

industrial/commercial redevelopment sites, empowerment zones and communities, and sites not listed on or proposed for the National Priorities List. *Id.*

President Clinton extended the Incentive on Dec. 17, 1999 to apply to expenditures through 2001. Public Law 106-70. The Taxpayer Relief Act was amended on Dec. 21, 2000, as part of the Consolidated Appropriations Act of 2001. P.L. 106-554. The amendments extended the Incentive through 2003, and expanded its application. The 2000 amendments expanded application of the Incentive to include expenses for remediation of sites not within a targeted area. P.L. 106-554. The Working Families Tax Relief Act of 2004 extended the Incentive a fourth time through Dec. 31, 2005.

In addition to extending the Incentive through Dec. 31, 2007, the Tax Relief and Health Care Act of 2006 also expands application of the Incentive. The Incentive now includes sites contaminated with “any petroleum product,” as defined in Section 4612(a)(3) of the Internal Revenue Code. That definition, in Title 26 of the Internal Revenue Code, “includes crude oil.” The definition of crude oil, in turn, “includes crude oil, crude oil condensates and natural gasoline.” 26 U.S.C. §4612(a)(1). By allowing deduction of expenses for the cleanup of these petroleum products, the legislation allows deduction of expenses for sites previously ineligible for the Incentive. For instance, leaking underground storage tank (LUST) sites contaminated with petroleum products, as defined above, may now qualify for the Brownfields Tax Incentive. LUST sites, while eligible for some brownfields grant funding, were not previously eligible for the Incentive. A report prepared by the Government Accountability Office (GAO) cites EPA data, which confirms 450,000 releases from underground storage tanks, of which “100,000 releases had not yet been fully cleaned up.” See United States Government Accountability Office, Report to Congressional Requesters, “Leaking Underground Storage Tanks, EPA Should Take Steps to Better Ensure the Effective Use of Public Funding for Cleanups” (Feb. 2007). The GAO Report also found that “[i]n the past 20 years, EPA and states have spent over 10 billion in public funds to clean up these releases.” *Id.*

Little current data exists demonstrating the frequency with which the Incentive is utilized. In fact, the author located only one report, prepared by the Congressional Research Service (CRS), which provides data evidencing potential use of the Incentive as a brownfields redevelopment tool on a state-by-state basis. See CRS Report for Congress, “Brownfields Tax Incentive Extension,” by Mark Reisch, Analyst in Environmental Policy, Resources, Science and Industry Division, CRS-1 – CRS-5, (Oct. 17, 2006). This report cites to a CRS survey conducted between June and April 2003, which counted 161 applications for certification for receipt of the Incentive in twenty-seven states. *Id.* at CRS-2. Of these 161 applications, 147 were approved. *Id.* However, twenty-three states reported receiving no applications for certification for the Incentive. *Id.* These states were: Alabama, Alaska, Arizona, Arkansas, Colorado, Hawaii, Idaho, Iowa, Kansas, Maine, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, Oklahoma, South Carolina, South Dakota, Utah, West Virginia, and Wyoming. CRS Report for Congress, “Brownfields Tax Incentive Extension,” by Mark Reisch, Analyst in Environmental Policy, Resources, Science and Industry Division at CRS-2 and CRS-3. It is unclear why these states received no applications for certification for the Brownfields Tax Incentive. In the twenty-seven states receiving applications for certification of the Incentive, the average estimated time for a decision on applications for certification ranged from same day approval to sixty days. CRS Report for Congress, “Brownfields Tax Incentive Extension,” by Mark Reisch, Analyst in Environmental Policy, Resources, Science and Industry Division at CRS-4 and CRS-5.

Cleanup of brownfields restores sites to productive use, facilitates job growth, and substantially increases tax revenues for local governments. Additionally, cleanup revitalizes otherwise dormant, and frequently blighted urban core areas, thus promoting smart growth by taking development pressures off undeveloped, open land. EPA updated its guidelines and other information resources to reflect this latest extension and expansion of the Incentive, which are available online at www.epa.gov/brownfields.

FROM BROWNFIELDS TO BRIGHTFIELDS—REINVIGORATING BROWNFIELD DEVELOPMENT WITH ALTERNATIVE ENERGY DEVELOPMENT PROJECTS

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In 1999, towards the crest of the mainstreaming of brownfields development and the 1990s technology boom, the United States Department of Energy (DOE) introduced the concept of redeveloping brownfields with renewable energy technologies, particularly solar energy, to bring high-technology jobs and clean energy to communities in need of urban revitalization and economic growth. DOE described such redevelopment projects as “brightfields” and launched the Brightfields Initiative within its Office of Energy Efficiency and Renewable Energy. While this program later lost its flagship status, it has been and continues to be successful in assisting the development of solar energy projects on brownfield sites and is responsible for institutionalizing the concept of using brownfields for the development of clean and renewable energy. However, with the nation’s current focus on renewable and clean energy, the “brightfields” movement is poised for a resurgence, albeit with a broader mission. This article will examine the DOE’s Brightfields Initiative and discuss the opportunities for broader “brightfield” development as a result of the convergence of state and federal policies and programs that encourage both brownfield and alternative energy development.

The DOE’s Brightfields Initiative

In 1999, DOE sought to play an active role in the brownfields movement by introducing the concept of reusing industrial properties for solar and other renewable energy technologies. Through its “Brightfields Initiative,” DOE developed a program to both promote the development of renewable energy technologies and address the challenges of urban revitalization, contaminated sites cleanup, and climate change. DOE defined a “brightfield” as

[t]he conversion of contaminated sites into usable land by bringing pollution-free solar energy and high-tech solar manufacturing jobs to these sites, including the placement of photovoltaic arrays that can reduce cleanup costs, building integrated solar energy systems as part of the redevelopment, and solar manufacturing plants on brownfields. DOE Press Release L-99-008.

See Energy Department Announces National Initiative to Redevelop Brownfields with Renewable Energy, EPA Press Release, L-99-008 (<http://www.epa.gov/swerosps/bf/html-doc/brightfd.htm>).

In its Brightfields Initiative, DOE focused on the use of solar energy technologies because solar technology requires “very little maintenance and can stand directly on the ground without penetrating the surface or disturbing any existing contamination.” *Id.* Moreover, because many brownfield sites are close to distribution lines, they are ideal for solar energy systems. The DOE’s Brightfields Initiative also serves as a means to encourage the development of solar technology by creating a market for the solar energy industry. To accomplish this goal, DOE provides financial and technical assistance to local governments and industry for the development of solar energy technology projects on brownfields.

The City of Chicago was the first community to participate in the Brightfields Initiative. *See* “Chicago Pioneers Brightfields Conversions,” *Waste Age*, Nov. 1, 2000 (http://wasteage.com/mag/waste_chicago_pioneers_brightfields/) and “Chicago ‘Blight field’ Converted to Brightfield, Spire Chicago Solar and Greencorps Chicago Replace a Brownfield Site,” Katrina Kernodle, Frances Kernodle Associates www.fkassociates.com/solarpower.html). In 1999, the City of Chicago and Commonwealth Edison developed a plan to develop a brownfield site with a photovoltaic (PV) manufacturing plant, a roof mounted PV system and a ground-mounted PV array. The PV manufacturing plant was designed to produce 3 megawatts of solar panels annually and was projected to create approximately 100 jobs. To ensure that a market existed for the solar panels, the city and Commonwealth Edison committed to purchasing

\$8 million worth of the solar panels per year and placing the solar panels on brownfield sites and other public buildings within the city. Since 2000, over 2 megawatts of solar energy systems have been installed in the City of Chicago. *See* the Chicago Solar Partnership Web site at www.chicagosolarpartnership.org.

Other brightfield developments include the plans to develop a 250-kilowatt (kW) photovoltaic array system on a former landfill near Sarasota, Florida. *See* Lauren Mayk, *FPL Has Sunny Spot for Solar Panel Project*, Sarasota Herald-Tribune, Mar. 18, 2006. The system will consist of 1,200 PV panels arranged on a two-thirds acre parcel of the former landfill and will connect directly to the distribution grid. *Id.* When this \$2.5 million solar system becomes operational in the second quarter of 2007, it will be the first large-scale solar energy system in the state of Florida. *Id.* While it is somewhat shocking that this relatively small solar energy farm will be the first large-scale solar energy system in the Sunshine State, it is telling that a brownfield site will likely serve as the foundation of Florida's future solar energy industry.

In Cedar Rapids, Iowa, a solar energy system was installed on a former factory and warehouse that is located in a brownfields redevelopment area of the city. *See* Alliant Energy Web site at www.alliantenergy.com/docs/groups/public/documents/pub/p014436.hcsp and the New Bohemia Web site at <http://www.newbohemia.org/NewBoSolarProject.htm>. The New Bohemia Solar Project consists of a 7.2 kW solar array system on a former factory and warehouse that was converted into a multi-use facility that includes commercial, studio, and residential space. The project received a grant from DOE and support from a broad range of community and economic interests including the Iowa Renewable Energy Association, Alliant Energy, the city of Cedar Rapids, the Iowa Department of Natural Resources, and the developer. The broad base of support for the New Bohemia Solar Project demonstrates the enthusiasm that brightfields projects create through combining the attributes of brownfield development, renewable energy, and urban renewal.

The Brockton Brightfield project is a 425-kW PV solar system that is the largest brightfield in the nation. *See* "Nation's Largest 'Brightfield' Dedicated in Brockton, Massachusetts," Renewable Energy Trust, Press Release, Oct. 26, 2006 (www.masstech.org/renewableenergy/press/pr_10_26_06_brockton.html). The system is located on a 3.7 acre parcel on the former Brockton Gas Works site where historical contamination was addressed through the installation of a protective cap, which while protective to human health and the environment, limits the options for future development at the site. *Id.* As with the New Bohemia Solar Project, the Brockton Brightfield was developed through a collaborative effort of local, state, and federal government; non-profit organizations; solar energy companies; and Constellation NewEnergy. *Id.* Funding for the \$3 million project was provided by a \$1.6 million city bond that was backed by a long-term contract with Constellation NewEnergy for the entire output from the solar system, a \$789,000 grant from DOE, and over \$1 million from the Massachusetts Technology Collaborative's Renewable Energy Trust. *Id.*

Natural Expansion of the Brightfields Initiative

The DOE's Brightfields Initiative only scratches the surface in terms of the opportunities for the development of alternative and renewable energy technologies on brownfields. In fact, the drivers of the original Brightfields Initiative, energy independence and climate change issues, have only become more pronounced since 1999. Calls for the development of domestic sources of alternative and renewable energy are ringing out from the White House, the Congress, and just about every State House across the country. The basis for the heightened interest in alternative and renewable energy includes national security, economic development, and environmental protection interests that are individually accepted by some segments of the population and collectively are accepted by a majority of Americans.

The overall consensus as to the need to develop and use domestic sources of alternative and renewable energy is, notwithstanding the individual bases behind

the consensus, driving the market in numerous ways beyond the “consumer-choice” market that existed when the DOE launched the Brightfields Initiative in 1999. Since then, the consumer-choice market has been enhanced by the adoption of state renewable energy portfolio standards and alternative fuel standards, which create a “regulatory market” for sources of alternative and renewable energy and fuels. Additionally, state governments, public institutions and private corporations have played an important role in using their purchasing power to grow the market for alternative and renewable energy and fuels by committing to long term contracts for the energy generated or fuels produced by these technologies.

Similarly, the federal government has played an important role in growing the market for alternative and renewable energy by: offering tax credits, purchasing green power, using alternative fuel vehicles, establishing a renewable fuel standard program, and offering grants and loan guarantees for alternative and renewable energy research and development. Lastly, the growth of the alternative and renewable energy sector has been fueled by the investment community which has been willing to invest in the development of commercial scale projects as well as in the development of emerging technologies. In fact, the investment atmosphere of the alternative energy over the last few years is often compared to the Internet-boom of the late 1990s. *See Keith Johnson, Renewable Power Might Yield Wind*, WALL ST. J., Mar. 22, 2007, at A8.

The emergence of a robust and economically viable alternative and renewable energy sector only adds viability to the DOE’s Brightfields Initiative and creates numerous opportunities for brownfields development involving all forms of alternative and renewable energy. This is a hopeful sign for the brownfields development movement, which has largely relied on retail and light industrial development as a means to return industrial properties to productive use. The alternative and renewable energy boom may help to spur a resurgence in brownfields development in areas where the capacity for retail and light industrial development has been exhausted or where these uses are not viable for particular sites.

Other Brightfields Applications and Opportunities

Brownfields are well suited for all forms of alternative and renewable energy projects, such as biofuel plants, coal liquefaction plants, waste coal plants, wind farms, carbon sequestration, and fuel crops. Moreover, the same fundamental brownfield drivers exist for the development of these energy technologies as the drivers for solar energy systems on brownfields — access to infrastructure and the market. Similarly, there are financial and other benefits of combining brownfield and alternative energy projects. In terms of financial benefits, the economic feasibility of a project can be significantly enhanced by combining federal and state grants available for brownfield development with the federal and state grants, loan guarantees, and tax credits that are available for alternative and renewable energy projects. Additionally, meshing brownfields with alternative and renewable energy may also help developers overcome facility siting issues because of favorable federal and state policies that support brownfield and alternative and renewable energy development. The following section provides examples of how brownfields have been used for the development of alternative and renewable energy projects.

Wind Farms on Former Mine Lands

Former mine lands often present opportunities for wind farms because these sites are underdeveloped, offer convenient access for the installation and construction of the turbines and towers, and provide commercial scale wind resources and access to transmission lines. *See “A Breath of Fresh Air for America’s Abandoned Mine Lands: Alternative Energy Provides a Second Wind,”* United States Environmental Protection Agency (http://www.epa.gov/superfund/programs/recycle/pdfs/wind_energy.pdf) and Mine-Scarred Lands Initiative Toolkit, United States Environmental Protection Agency, Nov. 2, 2006 (<http://www.epa.gov/aml/revital/msl/>). At least two wind farms have been successfully developed on former mine lands and one has been proposed. In Pennsylvania, a six-turbine wind farm was constructed on property where both surface and underground mining activities had been conducted. *Id.*

Similarly, in Tennessee, a three-turbine wind farm was constructed on a reclaimed strip mine. *Id.* While these are relatively small wind farms, they serve as excellent case studies for developing wind farms on former or abandoned mine lands. For instance, in developing these two wind farms, it was necessary to address various issues, such as community acceptance, siting, reclamation, wildlife, and subsidence. *Id.* There are likely numerous former or abandoned mine lands that could be developed to generate wind energy.

Moreover, in the case of abandoned mine lands, there may be resources from the Office of Surface Mining for reclamation activities that when combined with the tax credits for wind energy may help to make the project economically feasible.

Fuel Crops

There are several examples of using brownfields to produce fuel crops for biofuels. The rapid expansion of the ethanol and biodiesel industry have created a food versus fuel debate that questions whether productive agricultural lands should be used for the production of food or fuel. Production of fuel crops on marginally productive lands, such as brownfields, side-steps this ethical issue and offers additional options for brownfield developments. This is critically important for brownfields where retail, commercial, or industrial development is not feasible or desired. For instance, abandoned mine lands or mine-scarred lands are often located away from commercial and industrial areas; thus, retail and commercial development may be not be feasible. In these cases, the use of mine lands for fuel crops is an excellent way to reclaim the land and restore it to productive use. In West Virginia, for example, to encourage the use of former mine lands for fuel crops, the state has authorized “Bio-Oil Cropland” as an acceptable post-mining land use for reclaimed surface mines under the West Virginia Surface Coal Mining and Reclamation Act. *See* 38 C.S.R. 2 § 7.2.e.1.

The combined benefits of phytoremediation with fuel crops is also being examined at several industrial brownfields sites. Researchers at the SUNY College of Environmental Sciences and Forestry are examining the use of shrub willows to remediate the soil in industrial

settling basins. *See* “SUNY-ESF Harvests Shrub Willows for Sustainable, Green Energy,” press release, Feb. 1, 2007 (www.esf.edu/newspubs/news/2007/02.01.shrubs.htm). In addition to cleaning up the soil, the shrub willows can be periodically harvested for use as a fuel at a biomass wood-fired energy plant. *Id.* Similarly, researchers at Michigan State University are growing soybeans, corn, canola, and switchgrass on a two-acre brownfield site to determine whether the site can produce crops in the amounts and quality required for biodiesel or ethanol production. *See* “The Greening of Brownfields,” *Futures*, Fall 2006, Michigan Agricultural Experiment Station, Michigan State University (www.maes.msu.edu/publications/futures/fall2006/brownfields_fall06.pdf). The researchers are also examining the ability of the fuel crops to remediate the soil contamination at the site. *Id.* While employing fuel-crop phytoremediation at brownfield sites will not produce the yields of prime farmland, it will play an important role for the reuse of some industrial sites where other development opportunities are not available or desired, and will provide an opportunity for communities to play a role in the production of domestic sources of renewable energy.

Reforestation and Sequestration

Large tracts of impaired industrial lands, such as former mine lands, are suitable for reforestation for terrestrial carbon sequestration. *See* “Carbon Sequestration: A Local Solution with Global Implications,” United States Environmental Protection Agency, July 2004 (“Mine Land Carbon Sequestration”) (<http://www.epa.gov/aml/revital/cseqfact.pdf>). According to DOE, there are nearly one million acres of abandoned mine lands in the Appalachian coal fields that could provide opportunities for carbon sequestration and produce environmental and financial benefits to the local communities and the land owners. *Id.* at 3. Former mine lands are also attractive for sequestration projects because they are relatively low in value and have a high capacity for additional carbon storage. *See* “Community Benefits of Emissions Offsetting through Carbon Sequestration: Afforestation and Biomass Co-Firing,” presented by Aaron Dushku, Winrock International, at Conference on Revitalizing

Communities Through Integrated Restoration, Oct. 25, 2005. (<http://www.winrock.org/ecosystems/files/CanaanValley-Communities-final.pdf>). In addition to carbon sequestration, reforestation provides numerous other environmental benefits, including improving water quality by stabilizing the site and reestablishing soil that is capable of supporting native species; establishing critical habitat for plant and animal species; and improving aquatic habitats by establishing a tree canopy that will moderate the temperatures of creeks and streams. See Mine Land Carbon Sequestration, p.4.

Reforestation also provides economic benefits to the local economy by increasing the tax base through timber harvesting activities and the establishment of a recreation and tourism industry associated with fishing and hunting on reforested mines. *Id.* at 5. Moreover, landowners and mining companies can benefit from the carbon credits generated by reforestation operations. *Id.* at 6. For instance, the Chicago Climate Exchange, which is a voluntary greenhouse gas (GHG) emission registry, reduction and trading system, has developed a forestry carbon emission offset program where certain eligible forest projects, including reforestation, can earn Carbon Financial Instruments (CFI). See Chicago Climate Exchange Web site at www.chicagoclimatex.com. CFIs are GHG emission offsets that are issued in 100 metric tons of carbon dioxide and the market rate for a CFI generated in 2007 was \$3.45 on April 2, 2007. *Id.* If, as many expect, the United States establishes a program to regulate GHGs, the carbon credits generated by a reforestation project may significantly increase in value.

Biofuel and Coal Liquefaction

In a more traditional sense, brownfields can be used for the production of biofuels and coal liquefaction products. As biodiesel, ethanol, and coal liquefaction plants are chemical plants, they require access to rail and barge transportation and utilities—which many brownfields offer. Alternative fuel plants also contribute positively to the local economy by providing good-paying jobs for engineers, plant operators, and technicians. In Pennsylvania alone, there are several projects underway to build alternative fuels plants on brownfields. For example, in Erie, a 45 million-gallon

per year biodiesel plant is under construction on a former paper mill site. The plant will be located on thirteen acres of a former International Paper site and will employ about thirty-eight people. See Kara Rhodes, *Plant Lays Down Roots, Biodiesel Development on Way, Aims to Renew IP Site*, ERIE TIMES AND NEWS, Oct. 23, 2006, <http://www.eriemg.com/news.aspx>. While the economic impact of the Erie biodiesel plant pales in comparison to the former paper mill, the biodiesel project has been well received by the community and is seen as the cornerstone for future development of the former mill site. Similarly, at a former tannery in Clearfield County, Pennsylvania, an ethanol company is planning to construct a 40 million gallon per year ethanol plant. See www.sunnysideethanol.com and http://www.ethanolproducer.com/article.jsp?article_id=1445.

In addition to the ethanol plant, the company is constructing a wastecoal-fired cogeneration plant on the site to supply steam and electricity to the ethanol plant. As a result, the project will remediate the site and clean up a nearby waste coal pile, which contributes to acid mine drainage to surface and underground waters. http://www.ethanolproducer.com/article.jsp?article_id=1052.

The same company recently announced plans to construct an 88 million-gallon per year ethanol plant on a former tin mill site in Beaver County, Pennsylvania. See C.M. Mortimer, *Ross Company Proposes Beaver County Ethanol Plant*, PITTSBURGH TRIB.-REV., Mar. 24, 2007. The project will also include a coal-fired cogeneration plant, will create seventy full-time jobs, and will cost approximately \$250 million. *Id.*

Lastly, one of the first commercial-scale coal liquefaction plants in the nation is planned for a former mining site in Schuylkill County, Pennsylvania. The plant will annually convert 1.4 million tons of waste coal into 40 million gallons of diesel fuel, heating oil, and aviation kerosene, and 20 million gallons of low-octane gasoline. See Ultra Clean Fuels Web site at www.ultracleanfuels.com. The facility will cost over \$700 million, will create 600 permanent jobs in the region and has received significant support from Pennsylvania's governor and Congressional delegation, which has resulted in a commitment by the state to

purchase some of the fuel and a \$100 million low-interest loan from DOE. *Id.* However, like any new industrial development, the project has received stiff opposition from some local government officials and residents due to air pollution concerns associated with the plant. *Id.* Additionally, coal liquefaction projects are generally opposed by national environmental groups because of concerns that these plants emit large volumes of carbon dioxide and that the combustion of coal-derived fuels generates emissions that contain unacceptable levels of carbon dioxide.

Waste Coal Power Plants

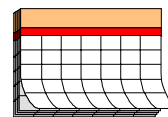
The development of waste-coal fired electric power generation stations on or near former mines and coal preparation plants is well established. In Pennsylvania there are thirteen operating waste coal plants; several others are in the planning and permitting stages in Pennsylvania and other states. *See* ARIPPA Web site at www.arippa.org and Energy Justice Network Web site at www.energyjustice.net/coal/wastecoal/facilities.html. These facilities reduce and eliminate the hazards and environmental liabilities caused by these former mining sites. However, these facilities have been generally opposed by the environmental community and some local communities because of the air pollution concerns associated with the combustion of coal.

Conclusion

As is demonstrated above, there are numerous alternative and renewable energy applications for former industrial sites. The regulatory, financial, and market incentives for both alternative energy and brownfield development will only help to strengthen the synergies that exist between these two development opportunities, which in turn will offer positive economic and environmental benefits to local communities throughout the United States.

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