Weighing Pros & Cons

Jumping into Hazardous Waste

Should your construction firm enter the hazardous waste remediation market?

Surely, the potential profits are enough to make any strategic planner think twice. Current estimates of the domestic hazardous waste market are around $17 billion and annual growth rates are expected to be around 15 percent.[1] Estimates for the total price tag for remediating all of the abandoned hazardous waste sites in the country have run as high as $750 billion.[2] Furthermore, the primary skills necessary for this market are closely aligned with those in which construction firms are already proficient. However, the decision to perform remediation work must be based on a careful analysis of the anticipated benefits and the potential costs.

The answers to some basic questions must first be answered. Exactly how large is the market and what are the individual market segments? What are the additional technologies necessary for such work, and how does my firm access them? What are the risks and obstacles to entering this market? And what is the optimal mechanism for market entry?[3]

The Pros

The Size of the Market

As mentioned, the potential size of the hazardous waste remediation market is staggering. For the long run, reliable estimates reach as high as $750 billion, broken down as shown in Table 1.

Of course, these expenditures will take considerable time to be undertaken. So, for the short run, the individual markets have shaped up as follows:

Superfund. The EPA National Priority List (NPL) includes 1,246 sites.[5] Another 26,000 sites[6] have been identified as being of less potential danger and have been placed on the Hazardous Ranking System (HRS) for attention by state level agencies. The General Accounting Office estimates that this list could grow to 368,000 sites if a more comprehensive inventory is taken.[7] Costs of individual site cleanups range from tens of thousands of dollars to millions, depending upon the extent of contamination. The largest Superfund settlement to date, at the Rocky Mountain Arsenal, is expected to be in excess of $1 billion, with the U.S. Army and Shell Oil Company paying for the cleanup.[8] Individual site cleanups cost an average of $20 to 30 million.[9]

Department of Energy. In June 1990, DOE published its "Environmental Restoration and Waste Management Five Year Plan" for fiscal years 1992-1996. The plan identifies 3,700 potential release sites at 500 facilities, with an additional 5,000 "vicinity properties" which may also be affected by their proximity to DOE facilities. There are presently 17 DOE facilities on EPA's National Priority List. DOE has allocated $30 billion through 1995 and expects to achieve its goal of cleaning up all of its contaminated waste sites and bringing its aging facilities into full environmental compliance by the year 2019.

Department of Defense. The Defense Environmental Restoration Program was established in 1984 to facilitate the cleanup of DOD hazardous waste sites. DOD has identified 14,401 sites at 1,579 active installations and 7,118 formerly used properties which may require some form of remediation.[10] There are 96 DOD sites on the EPA NPL list. DOD spent $600 million on cleanups in 1990. This market has already seen aggressive entry by firms familiar with DOD procurement procedures. For example, Lockheed was recently awarded a $30 million contract to provide technical and management assistance to EPA laboratories.[11]

by Andrew J. Hoffman

RCRA Corrective Action. Corrective action under RCRA is a program for cleaning up hazardous waste sites at the roughly 5,700 operating facilities regulated under RCRA, which fall outside the boundaries of CERCLA since they are not abandoned or closed. These facilities may have as many as 80,000 separate locations where hazardous waste disposal/treatment activities formerly took place.

Real Estate Development. States have now begun to develop new laws that require parties to undertake environmental audits at the time when: a property is sold; a business changes ownership; a company merges with another; a company goes bankrupt; an industrial lease expires; or the cessation of operations by an industrial establishment. The first of its kind, New Jersey's Environmental Cleanup Responsibility Act[12] or ECRA has been nicknamed the Environmental Contractors Retirement Act because of its huge profit potential. Other states such as California, Delaware, Maryland, Michigan, New Hampshire, Pennsylvania, Massachusetts, Connecticut, Iowa , Illinois and Missouri have bills that closely follow the New Jersey law.

Leaking Underground Storage Tanks. Subtitle I of the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA requires strict regulation by EPA and the states of underground tanks that store hazardous substances. EPA estimates that there are approximately two million petroleum underground storage tanks at 70,000 facilities subject to subtitle I and 50,000 hazardous substance USTs at 30,000 facilities that are subject to the Corrective Action provisions. Based on these data, and the expected tank life expectancy of 15 years, EPA estimates that 20 percent of these tanks are currently leaking.

Accessibility of Multiple Technologies for Superfund Cleanups

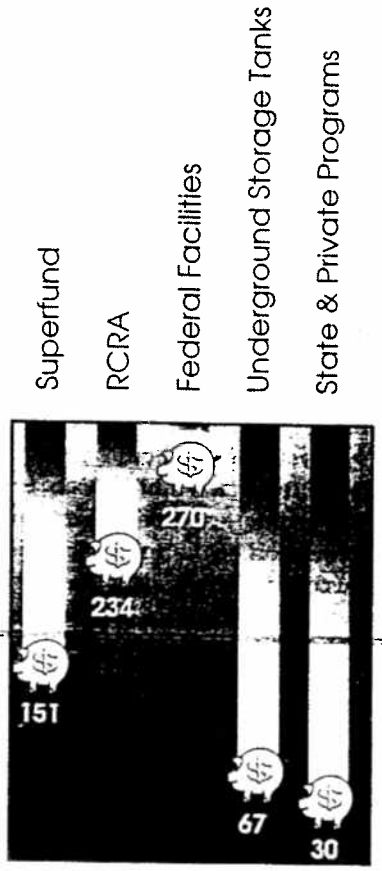
Technical competencies compatible with remediation which construction firms already possess can be broken up into 13 categories, as shown on Table 2.

Additional technical competencies to undertake the action portion of remediation may not be difficult to obtain. Since most of the science of these technologies has already been developed and is universally known, they will be difficult to patent or keep as a trade secret. As a result, technology vendors, most of which are small and have little market power, will be forced to come to larger firms, such as construction entrants, for access to the market through their complementary assets.

Remediation technologies must address both soil and groundwater contamination (if present) and can be performed in one of three basic formats: in-situ, prepared bed or in-tank reactor. To date 210 different technologies have been specified in

Table 1

Estimated Expenditures on Hazardous Waste Remediation
(in billions of 1990 dollars)



Total 752

Table 2

Technical Competencies for Remediation Services

- Well Drilling and Soil Sampling
- Sampling and Analysis Services
- Geotechnical Services
- Engineering Design Services
- Construction Management
- Hazardous Waste Transportation
- Off Site Treatment Services
- Excavation
- Underground Tank Testing
- Underground Tank Removal
- Underground Tank Installation
- On-Site Remediation Technology
- Off-Site Disposal Services

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the EPA Record of Decisions.[13] They can be classified into five basic categories: thermal treatment, solidification/stabilization, physical separation, chemical treatment and biodegradation.

Thermal Treatment can be divided into two categories: high temperature and low temperature. High temperature thermal treatment uses temperatures between 2,500 and 3,000F to destroy or break down hazardous wastes into other compounds through incineration, pyrolysis, wet oxidation and vitrification. Low temperature thermal treatment utilizes temperatures between 200 and 900F to essentially separate organic contaminants from soils, sludges and other solid media through evaporation. No incineration or pyrolysis takes place.

Solidification/Stabilization techniques facilitate a chemical or physical reduction of the mobility of hazardous constituents without destroying them. Solidification generally produces a durable monolithic block. Stabilization involves the addition and mixing of materials that limit the solubility or mobility of the waste constituents even though the physical characteristics of the waste may be unchanged.

Physical Separation techniques separate hazardous constituents from the carrier soil and each other through various methods such as volatilization, adsorption, extraction, or filtration but do not alter their chemical structure.

Chemical Treatment techniques destroy or detoxify hazardous constituents through the use of chemical oxidation and reduction reactions. Oxidation reactions are generally applied to waste streams contaminated with organics because heavy metals (with the exception of arsenic) are more mobile at higher oxidation states. Chemical reduction of soil contaminants has more limited applications than oxidation. However, soils contaminated with chlorinated hydrocarbons and certain heavy metals are receptive to reducing agents.

Biodegradation uses bacteria, fungi or micro-organisms to detoxify organic matter. There are several types of applications including composting, in-situ, solid phase, and slurry phase which may occur in aerobic (with oxygen) or anaerobic (without oxygen) conditions. The advantages to bio-remediation are dramatic. It could cost less than $100 per ton compared to such techniques as incineration that may cost as much as $1,000 per ton.[14] The technology can be employed in a variety of in-situ conditions: soil, groundwater, lake, or river. However, regulators are wary of the drawbacks. It is a very lengthy process from initiation through completion, and, it is extremely difficult to verify complete detoxification of wastes under in-situ applications.

The current trend in cleanup methods at Superfund sites shows thermal treatment and solidification/stabilization to be the predominant technologies. Thermal treatment was specified in 41percent of these cleanups between 1982 and 1989.[15]

However, current research for future technologies shows a move towards more physical, chemical and biological treatment methods. Forty-two percent of technologies seeking approval in EPA's Superfund Innovative Technology Evaluation (SITE) Demonstration program in 1990 utilized physical and chemical methods.[16]

The Cons

Risks to the Remediation Contractor

The hazardous waste remediation contractor faces many risks when considering market entry. These risks can be grouped into three categories (besides general business risk): liability, financial and market risks.[17]

Liability Risks associated with hazardous waste remediation work arise out of the potential for accidental releases of hazardous substances during the remediation process. For example, O.H. Materials was sued for an accidental release of an acid cloud during the cleanup of the Drake Chemicals site in Lock Haven, Pennsylvania on March 23, 1982. Payment totaled $133,296.27.[18] Persons injured by hazardous chemicals can potentially seek common law remedies through four legal actions: trespass, nuisance, negligence, and strict liability. These remedies are referred to as toxic torts.

A *trespass* action may be brought by a plaintiff who owns a parcel of land that has been physically invaded by some substance so as to injure the rights of the landowner. This action has been used successfully to recover damages. A *nuisance* action is used to defend the right to use one's property free from disturbance or interference from activities carried on by others on another property. The most com-

mon remedy obtained in a nuisance suit is the abatement of the nuisance. In a *negligence* action, the plaintiff must show that the defendant was obligated to conform to a specific standard of due care, that the defendant failed to so act, that an injury occurred, and that the lack of due care was the proximate cause of the injury.

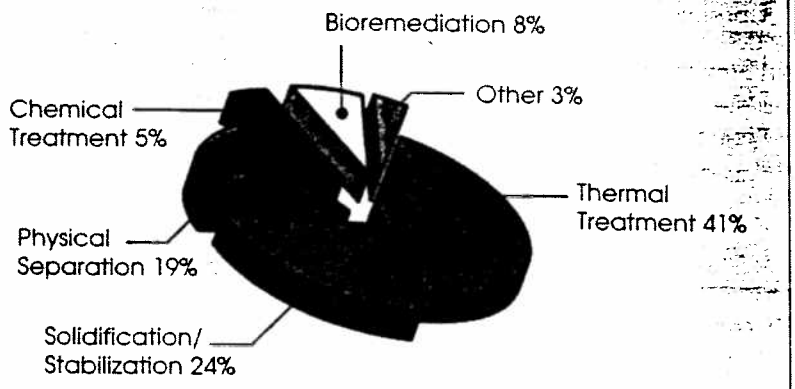
Strict liability is considered to be the most viable theory for plaintiffs. An important aspect of the liability risks that make this industry different than other high risk construction activities such as bridge or tunnel building is the long term, latent aspect of the injuries. Medical injuries such as a preponderance of cancer or leukemia in a specific geographic location take a long time to develop. Therefore, remediation contractors may be exposed to risk long after their work is completed. Furthermore, even if the injury is detected early, the scope of the injury and the subsequent award size is extremely vague and open to subjective reasoning by the courts. This may leave contractors open to unlimited liabilities.

Another important aspect of the liability risks associated with Superfund cleanups is the risk of individual liability in the case of damages resulting from the release of a hazardous substance. Courts have held corporate employees, officers, directors, and shareholders directly liable for their hazardous waste management practices.

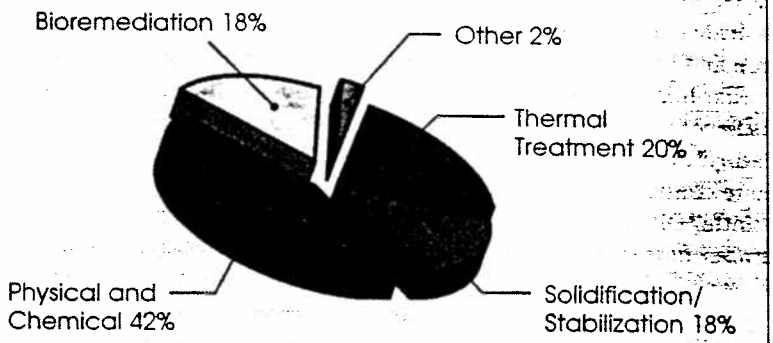
Financial Risks to the remediation contractor manifest themselves in several ways. The most obvious are the financial risks due to a lawsuit and judgment which could easily bankrupt a small firm and severely damage a large firm. One such example of a large firm who feared these risks is Phillips Petroleum. Phillips established a subsidiary called Incinitrol (Denver) to provide incineration services to outside clients. The project had been developed for two years when the board of directors decided to shut it down. Barbara Price Thurman, manager/corporate safety and environment states that the reason for the shutdown was a fear that the "corporate veil" theory would not hold. "Is it worth placing everything at risk?"[19] The Phillips board of directors decided that the answer was "No!"

Table 3

Superfund Site Cleanup Technologies Specified Between 1982 and 1989



Technologies in the SITE Demonstration Program



Market Risks are unusual for hazardous waste remediation. The market is driven primarily by federal and, to a lesser extent state regulation, as well as industry and public opinion. Regulations have been changing steadily for the past 10 years. For example, if a firm invested heavily in perfecting cap and containment technologies in the early 1980s, the SARA amendments effectively eliminated that company's market segment. If a company invested heavily in incineration technologies in the late 1980s, it is probably watching its market segment dry up as the siting of commercial incinerator facilities becomes increasingly impossible. Another concern resulting from unsteady regulations is the possibility that regulations and technology might change and leave companies liable for what they thought they had cleaned up already.

Institutional Obstacles to Remediation Technology Development

Institutional obstacles to innovative technology development fall into three categories: pollution insurance,

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Table 4

Complementary Assets in Hazardous Waste Remediation

Construction Companies	Environmental Firms
Project Scheduling	Vertical Integration
Project Estimating	Understanding of technology
Project Management	Risk Management
Labor Relations	Public Relations
Contract Preparation	Environmental Law
Pre-existing PRP relationships	Regulatory Understanding

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bonding, and financing.

Pollution Insurance. The hazardous waste contractors insurance program could include numerous special insurance coverages.[20] (See "Insurance and Bonding", page 37.)

Just because these policies exist, it is in correct to assume that they are readily available to the hazardous waste contractor. A 1988 General Accounting Office report stated that "the number of insurers writing pollution insurance, the number of policies written, and the total pollution liability coverage decreased dramatically from a 1984 peak. Simultaneously, the average premium for insurance increased to as much,as 11 times its 1982 level. Insurance contracts become more limited in their coverage and in some cases provide no real protection to operators from financial losses arising out of pollution damage."[21] Many policies that are written today are "claims made" policies. This means that claims can only be made during the term of the policy. This offers no protection for the contractor who is hit with a claim after completion of the project as is most often the case. But David Dybdahl of Coroon and Black Environmental Insurance Services believes that the pollution insurance market has been improving since that 1988 report. He states that "anyone who can't get insurance is dealing with an incompetent broker."[22]

In today's market many hazardous waste contractors are choosing to self-insure their practices through a captive insurance company, a self insurance association with other contractors or simply a financial trust fund. Another common practice for the contractor is to set up a separate subsidiary for its hazardous waste operations. Any liabilities that this subsidiary faces would hopefully be diverted from the parent company which would be hidden "behind the corporate veil".

Insurance companies may have a very practical reason for avoiding claims. An insurance company can become liable for pollution claims under CERCLA. According to a recent jury verdict in Denver, Colorado, The Hartford Accident and Indemnity Company was required to pay investigation and cleanup costs associated with groundwater contamination at the Broderick Wood Products site. The court chose to overrule the pollution exclusion in the CGL policy. This case set a precedent with the verdict rendered in favor of the insured.[23]

Bonding. Bonding companies are equally uneasy about becoming involved in the hazardous waste services market. Tom Young, bond manager for Aetna Casualty and Surety Company states that "most sureties will not bond a contractor who is exposed to hazardous waste, particularly Superfund."[24] He feels that courts are unreasonably holding contractors and sureties responsible above and beyond the terms of the contract, even if claims turn up years after the cleanup is completed. Bill VerPlanck, of the Surety Association of New England agrees, "Bonding companies are reluctant to get involved. Some do it, but only if there is a 'hold harmless' clause that indemnifies the bonding company from any work beyond the scope of the contract."[25] Both Aetna and the Surety Association are actively pushing EPA to create a hold harmless indemnification clause in Superfund with clear indemnification limits for surety bond holders. They are also assisting EPA in properly analyzing and improving the insurance market in hazardous waste contracting. Only with all the possible risk management mechanisms in place does Aetna feel that a bonding company can begin to accept its portion of the risk.

Financing. "Wall Street likes what it sees" claims one headline in *Chemicalweek*.[26] "The U.S. Environmental market is a good investment with tremendous potential for growth" says Paul Zofnass, head of the environmental advisory group of Oppenheimer & Company[27] Wall Street analysts have taken strong notice of the growth in the environmental engineering and contracting markets. The number of interested investors has prompted an outpouring of public offerings, including those of environmental funds run by Oppenheimer Global, Fidelity, Freedom, Merrill Lynch, New Alternative, Progressive and SFT. These funds tend to focus on the large environmental firms.[28]

The market is not as aggressive for smaller companies. Lawrence Greenberg, manager of the Fidelity Select Environmental Services Portfolio says that he is leery of small hazardous waste companies.[29] He cites as one of his reasons his losing experience with a small company during their failed attempt to build a hazardous waste incinerator. He goes on to say that a wise investor would stay away from most initial public offerings. He feels that "companies are coming public earlier. The longer the

fad is in place, the less the quality names are coming up."[30]

Lending institutions are also wary of becoming involved with companies that perform hazardous waste cleanups. David Floreen, Senior Vice President of the Massachusetts Bankers Association sees some lenders finding the market to be too good to pass up. However, he also feels that these institutions will temper their enthusiasm with the unstated liabilities that these firms face. If a firm is hit with a major lawsuit, will they be able to pay off their loan? He feels that the odds of that happening right now are just too small. Furthermore, if a bank chooses to manage a long term bailout of the troubled firm and assumes any kind of management control to accomplish this, he feels that the liberal interpretation by the courts of what constitutes an owner/operator may classify the bank as a PRP.[31] Sometimes, the cleanup costs can exceed the value of the land. Recently a Texas bank disavowed a foreclosure on an oil refinery site after learning that it might become liable for its cleanup under CERCLA.[32]

Political Uncertainty for Superfund

Finally, Superfund faces congressional reauthorization next year and two factors make it a tough fight. First, the total cost estimates for nationwide site remediation make such a goal unreasonable. President Clinton specifically cited the Superfund program as being financially inefficient in his State of the Union address. The second factor deals with the relative priority that hazardous waste site cleanups receive. An EPA report entitled *Unfinished Business*[33] found that, although this effort receives substantial portions of EPA time, money and effort, the relative weight it should be given is considerably less than more pressing problems such as pesticides, indoor air pollution, radon, global climate change and contaminated drinking water.

However, voter attention will not be so easily distracted from such a visible problem. As Ali Webb of the League of Conservative Voters states, "People will not go into the voting booth and vote for a candidate because he supports saving tropical rain forests." But they will, she says, if the issue is a toxic waste site in the district.[34] When an environmental threat is clear and definable, such as a Superfund site, politicians know where to stand with their constituency. This attitude can be expected to fuel and, more likely, streamline the continued efforts to clean up sites in this and other programs.

What Should the Interested Contractor Do?

What is the best strategy for market entry by construction firms? Although the project management and construction/earth moving skills that construction companies possess are precisely the skills necessary to undertake the action phases of remediation, this is completely unfamiliar territory. In order to successfully implement hazardous waste cleanups, firms must first develop some new technical and non-technical skills.

Several options are available. Construction companies could try to develop the necessary technical capabilities in-house through individual personnel acquisitions or through the purchase of existing companies. The environmental industry as it exists today was built on corporate consolidation through buyouts and mergers, and this trend will probably continue. However, another option may offer more advantageous results. Strategic partnerships with environmental design firms may result in strongly competitive coalitions through the sharing of complementary assets. As more and more clients look for complete design-build services, organizations that dominate the market will manage all three aspects of the cleanup process: contamination identification, remedial design and cleanup implementation. To successfully offer skills in each one of these areas, partnerships between construction management and environmental firms will be crucial.[35]

Some construction companies have already begun to gear up to compete in this market. Since they are already prepared to provide sophisticated construction management services, many believe that they will dominate. Thomas Thurston, Program Manager for Sverdrup Environmental, a newly formed subsidiary of Sverdrup Corp., feels that Sverdrup, as a design-construction organization, is better positioned for this market than the traditional environmental consulting firm[36].

Micheal Skriba, Technical Director of the Environmental Services Unit for construction giant, Fluor Daniel Inc. agrees.[37] Although he does not think that construction companies will push environmental contractors out of the business, he does feel that they will dominate and the environmental firms will subcontract to them.

One construction company, Summit Constructors, Inc., has already successfully capitalized on this market opportunity. The firm took its experience in water and wastewater facilities and applied it to the environmental cleanup of groundwater. "This year has been our best year yet, with an expected $100 million in revenue," says Vice President Walter J. Bacer. The company plans to add 80 more people to its 400-person staff.[38]

The construction company will need to acquire or gain access to certain complementary assets which environmental engineering and contracting firms already possess. The construction company, on the other hand, holds certain complementary assets that environmental firms will need to acquire in order to access the construction portion of the remediation market.

Despite the great potential for conflict, many companies successfully di-

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versify and grow via joint ventures. When projects get larger, technology more expensive, and the cost of failure too large to be borne alone, joint venturing becomes more important.[39] An important part of this equation in the hazardous waste field is the management of risk. In particular, under the Superfund program the liability of a particular firm depends, not necessarily on the extent of its involvement, but rather on the depth of its pockets. Contracts between owners, environmental firms and construction companies should pay careful attention to the appropriation of risk for environmental liability.

In order to alleviate the high risks that cleanup contractors bear on hazardous waste cleanups, EPA has recently published guidelines in the Federal Register[40] to offer indemnification to response action contractors (RACs) for negligent releases arising from response action activities at sites on the National Priority List and at sites of removal actions. Under this proposal, EPA will apply a strict underwriting program to its Superfund RACs and develop an award-fee plan that rewards contractors based on their performance. The success of this program to minimize risk remains to be seen.

The disadvantages to joint ventures must be carefully considered. There is always the risk that the partner won't perform according to the terms of the contract. There is also the danger that a partner may learn the skills of the other partner and attempt to use this newly gained knowledge to go it alone, possibly taking some valuable employees with them. However, given the potential advantages of successful coalitions and provided that carefully drafted contracts protects all partners, strategic alliances offer the greatest opportunity to increase profits through maximizing market share. CBR

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