



Expect the Best but Plan for the Worst: Negotiating Contracts for Remediation Services

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The risks associated with environmental remediation projects are of concern to engineers, consultants, contractors, owners, and the public. The cost, scheduling, and other uncertainties inherent in performance of construction at sites contaminated by hazardous substances dictate caution with respect to contract terms. Further, the possibility that conditions will be exacerbated by the work, or the public or workers exposed to on-site substances, makes remediation projects of particular concern to those who will be held accountable for the effects and impacts of such substances.

This article discusses particularly important contractual issues and suggests approaches for liability allocation and incentives. Practical, effective, realistic approaches to management of environmental remediation are presented, including the form of contract utilized, negotiated terms, attention to contractor selection and management, and the parties' relative economic strength.

Work on sites affected by hazardous materials is basically construction work in an unpredictable environment. Attention to health and safety and to the prevention of occurrences that could make the situation worse or cause third-party exposure is essential due to the substantial liability associated with hazardous materials. Cost control is also invariably of central concern to owners.

Contracts for work involving the risk of releases of or exposures to hazardous substances involve particularly thorny issues. Contractual terms relating to liability for correction of errors, consequential damages, site access, indemnity, insurance, limitations of liability, worker health and safety, reliance on the work of others, force majeure, differing site conditions, and regulatory interface are heavily negotiated.

This is not the time for owners, consultants, or contractors to sign standard form contracts supplied by the other party, unless the risks are understood and factored into the cost of the work. Agreement on contractual issues is crucial to the implementation of environmental remediation projects and effective project management and liability

control, from both the owner's and the environmental consultant/contractor's standpoint. Treating an environmental remediation action project as conventional construction invites problems. It is essential to negotiate the terms of contracts with a clear understanding of the risks, insist on a fair allocation of liability, and plan for uninsured exposures.

SELECTING THE TYPE OF CONTRACT

A decision as to what form of contract should be used for any particular remediation project must take into account liability issues, schedules, cost, and the extent to which site conditions are known and the work is capable of estimation. The willingness of the parties to shoulder risk in exchange for potential profit depends largely on the level of control to be afforded the liable party. No control should mean no liability. The party's economic status should also be evaluated. There is no point in obtaining an indemnity from a party with no assets or insurance. The level of certainty regarding the work and site conditions, and the owner's timing and budget limitations, are usually driving factors in establishing a contractual relationship. Sometimes cost is overshadowed by schedule.

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For example, an owner may elect to dig, haul, and dispose of hazardous materials due to the time constraints of a real estate transaction. Unit prices may be a sensible cost basis in this case. If the schedule allowed, however, that owner might elect to bioremediate to save costs and avoid disposal. It is ill advised to contract for a remediation project fixed price (lump sum) if the plans and specifications are not sufficiently detailed or complete to allow a contractor to do adequate takeoffs and labor estimates to arrive at a realistic estimate. Attempting to use a fixed-price contract for an uncertain scope invites change orders (and therefore overruns), project administration headaches, poor workmanship, and schedule delays.

Using competitive bidding and a fixed-price contract for a well scoped, adequately engineered, specified, detailed, and quality-assured and controlled set of plans and specifications, however, places incentives in the right place (on the contractor to maximize profit by minimizing cost) while allowing the contractor to properly estimate the work and arrive at a realistic price and schedule.

To run a remediation job properly, it is necessary to select an appropriate contractual vehicle, exercise adequate project management attention to insure proper performance, and intervene on a timely basis if the project gets "off track."

Basic Types of Contracts

There are two basic types of contracts—fixed-price and cost-reimbursable—and many variations of each. Each type involves different levels of risk shifting and different business considerations. Time-and-material or unit-price arrangements are variations of cost reimbursable agreements, though they resemble fixed price contracts in some respects. In some cases, cost-reimbursable arrangements are later converted to fixed-price. Incentives such as bonuses, liquidated damages, and performance guarantees may also be incorporated into contracts.

Fixed-Price Arrangements

In a fixed-price or lump-sum arrangement, the contractor usually assumes virtually all of the risk, including cost overruns, the risk of errors requiring rework, casualty losses, consequential damages, and loss of or damage to the construction work in progress and the owner's existing property (though all of those points are negotiable, if the owner so chooses). The contractor agrees to perform the scope of work for a fixed sum. If the work costs more, the contractor absorbs the additional cost. The work can cost more for a variety of reasons, the most common being low estimation on the part of the contractor.

Other possible problems include price escalation in equipment or materials, rework necessitated by errors, and excess casualty losses, such as substantial uninsured losses or losses within the deductible of a builder's risk policy. Due to the possibility of such events, contractors normally include a substantial allowance for contingencies in a lump-sum bid. A 20-percent contingency is not unusual in some circumstances. The amount for contingency is in addition to whatever allowance is made in the bid for profit.

Construction (including remediation) is a relatively low-margin business, so contractors have substantial incentives to control costs and protect the contingency for error in their fixed bids. This is due to the fact that to the extent that no errors or other problems occur, project profitability goes up, sometimes by the entire percentage of contingency for error. It is easy to see how fixed-price work can be potentially very financially advantageous—but extremely risky—to a contractor. In a fixed-price arrangement, the contractor assumes tremendous risk in exchange for the opportunity to make high levels of profit by outperforming its own projections and expectations.

Unfortunately, many contractors are unduly optimistic, and frequently encounter circumstances in which anticipated costs outstrip contingencies. What generally occurs under those circumstances is an attempt to "get well on change orders" by submitting for the owner's payment items that might arguably be within the scope of work. This leads to increased costs, claims, litigation, and ill will.

Those who contract with others on a fixed-price basis can save all parties a great deal of aggravation and expense by contracting only on the basis of complete and detailed plans and specifications, using competitive bidding, and accepting bids only from contractors who have proven track records for working on a fixed-price basis without overruns or excessive levels of contested change orders. It is also essential to not accept fixed-price bids that are obviously too low to be the result of a realistic estimate. Every fixed-price proposal should be clarified sufficiently to avoid unexpected "extras" or "hidden costs." A deal that looks like a mistake, or seems too good to be true, usually is.

It is also easy to see why fixed-price contracts can be disadvantageous to owners, who must pay the contingency for error whether or not any errors are ever made. Many owners, however, prefer the (at least apparent) certainty of a fixed-price arrangement, and believe that with sufficient

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project supervision and holding a hard line on changes, fixed-price work produces the desired result at the least cost, due to competitive bidding. This is true only when use of a fixed-price contract is appropriate, due to the availability of a set, detailed scope.

Cost-Reimbursable Arrangements

From an absolute cost control standpoint for owners and a lowered risk standpoint for contractors, the best contract is frequently a cost-reimbursable arrangement with a fixed fee for a set scope of work. (Cost-plus-fixed-fee arrangements are within the definition of cost reimbursable. Cost-plus-percentage-of-cost contracts are not discussed here, because the contractor has no incentive for cost control but rather has an incentive to incur the highest possible cost in such an arrangement, thereby maximizing profits.)

There are two basic types of cost reimbursable contracts: completion and level-of-effort.

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Completion type. In a completion-type cost-reimbursable arrangement, the contractor agrees to perform (complete) the entire scope of work for the actual cost of that work (costs are audited, or at least the right to audit is afforded the owner) plus a stated fixed fee. If, for example, the contractor estimates that the work will take 200,000 labor hours, it may agree that the fee will be \$20,000. Such a fee would provide a predictable profit margin on performed work, assuming no losses chargeable to the contractor and performance within labor-hour estimates. If the project takes 400,000 labor hours, the contractor is still under an obligation to perform, but receives no additional fee, and profit margin is tremendously reduced. Unless the scope of work is capable of firm estimation, cost-reimbursable completion-type contracts are bad deals for contractors. They also become bad deals for owners when contractors try to "get well" on price by "shaving" performance (i.e., the owner doesn't get quite the quality or quite the scope bargained for), a natural response to sinking profit levels. It is much more prudent to build in allowances or options for pricing after certain levels of effort or funds are expended. For instance, the parties may agree that excavation of over some set number of cubic yards of contaminated soil will be subject to change order.

Level-of-effort type. In contrast, a cost-reimbursable level-of-effort type of contract simply sets a projected budget (labor hours or money, generally), together with a fee to be paid for that level of effort. It is understood that when the stated level of effort is achieved, more negotiations regarding remaining work (and cost and fee) will ensue. The contract provides that the contractor will notify the owner when certain levels of effort are achieved or have been expended, so that the work can be rescoped, if necessary, or at least before the not-to-exceed figure is met. To be successful, and to have satisfied clients, the contractor must stick close to schedule and budget, but the contractor is not operating under the same risk scenarios as in a fixed-price or completion-type cost-reimbursable arrangement.

A cost-reimbursable arrangement (with or without level-of-effort provisions) is usually used when the project is not or cannot be sufficiently specified or engineered without initial field work, or when the owner's schedule or other constraints do not allow, for whatever reason, the development of detailed plans and specifications.

Under a properly administered cost-plus-fixed-fee arrangement, the owner pays only for the price of the work, plus an agreed-upon fee. As there is no contingency for error in such an arrangement, the contractor normally assumes a much lower level of risk than in a fixed-price arrangement. Usually, for example, a contractor performing work in a cost-plus-fixed-fee arrangement will agree to reperform faulty work only on the basis of cost without additional fee, at least to some reasonably expected percentage of error; thereafter, the contractor may be obligated to cover the cost of its own errors.

This arrangement, whereby the owner pays even if the contractor makes an error, is logically a result of the owner getting the advantage of not being automatically charged in a fixed-price bid for anticipated rework that never occurs. Because the contractor has no contingency in its pricing for rework, the only pockets available for such costs to come out of are the contractor's profit fee or the owner's funds.

As some rework is inevitable on any job, the parties should agree that, at least to some reasonable level, the owner will, in a cost-reimbursable arrangement, compensate the contractor for the actual cost of fixing the contractor's errors. Uninsured losses (claims for pollution, for example) are another area in which the owner frequently assumes at least partial responsibility due to lack of a contingency. Owners often rightfully balk at assuming such liability in the face of the contractor's negligence; negotiations are usually necessary to resolve risk-sharing issues for uninsured losses.

Despite most owners' skepticism, a cost-reimbursable arrangement often makes a great deal of sense; the owner pays no more, and with proper negotiations and contract administration, pays less, than if the job had been bid at a fixed price. (Of course, it is essential to assure that items made specifically project reimbursable are not also included as part of the contractor's indirect cost allowances.) In a cost-reimbursable arrangement, the contractor is penalized for having made errors by the fact that it must perform additional work (to fix errors) at its own cost but without profit, thereby reducing the profitability of the project as a whole, and tying up otherwise available labor on nonprofitable work. This arrangement also puts incentives in the proper place: on the contractor, to avoid errors, while not creating high levels of incentives to shortcut the work to avoid costs and maximize profits.

In a cost-reimbursable project, the contractor has little exposure to cost overruns and frequently has very little liability for schedule slips. Even in a cost-type project, however, the contractor is usually asked to project budget and schedule and notify the owner when certain milestones occur, according to project estimates. Cost-type contractors that overrun their own projections do not have satisfied or repeat clients.

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Though cost-reimbursable contracts can be very effective on projects incapable of fixed-price bidding, they demand more involvement of the owner or owner's representative than do fixed-price projects. Because the contractor is being paid on the basis of cost, it is critical that invoices be properly supported and statements audited. Some owners are so interested in certainty of price, having another party attend to the work, and avoiding the necessity of day-to-day supervision and control, that they avoid cost-reimbursable arrangements.

Convertibles and Bonus/Penalty Arrangements

Sometimes an entire project will be performed on a cost-reimbursable basis, such as projects that are "fast tracked" by commencement of construction during the course of engineering. In some instances, the contract will provide that a cost-reimbursable arrangement will be converted to a fixed-price agreement on completion of sufficient engineering and specifications to allow for realistic fixed-price bids. A convertible arrangement often offers the best of both worlds by using a contract form that changes when appropriate to the work.

Some contracts are set up to provide a bonus for early or particularly cost-effective performance; sharing of any cost savings is a frequent way of providing incentives to contractors. Liquidated damages and performance guarantees also provide incentives for timely or effective performance. Creative, fact-specific management of remediation projects fosters effective performance.

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Unit Price/Time and Materials

Unit-price and time-and-materials arrangements are usually used when quantities or effort required are unknown. Unit-price contracts are useful because they generally involve no extras; they are used generally for relatively straightforward and simple scope projects, such as loading materials for disposal, excavation of volumes of contaminated debris, and so forth. The use of unit prices allows easy comparison of prices among contractors and an "on-call" basis of contracting as the need for the services arises.

Not-to-Exceed Contracts

A not-to-exceed arrangement is the contractor's worst-case contract. If the contractor underruns the budget, it "leaves money on the table" in the form of budgeted but unused funds, in which it does not share even though performance exceeded expectations. If the contractor overruns the budget, it "eats" the excess cost. The contractor can't win. Most contractors will revise a simple not-to-exceed contract into a cost-reimbursable level-of-effort type arrangement by providing that the not-to-exceed figure will not be exceeded without the owner's approval and opportunity to revise the scope of the project.

SPECIFIC CONTRACTUAL ISSUES

Regardless of the form of contract used, the parties should engage in

very project-specific negotiations to resolve potential concerns before the job starts and to avoid problems and misunderstandings during project performance. Set out below are some of the contractual areas that are more heavily negotiated when the project scope involves environmental remediation. Often, how an issue should be resolved depends on the choice of the form of contract.

Force Majeure Occurrences

If inclement weather or other somewhat predictable "force majeure" may slow the work, the parties will often set allowances for such matters as anticipated weather delays in the contract, and allocate the risks of additional delay on some agreed-upon basis; for example, the owner will extend the schedule but not provide additional compensation to the contractor for thirty days of weather delay in the project schedule. To the extent that weather delays exceed thirty days, the owner will pay the costs of standby, but no additional profit. A fixed-price contractor must provide sufficient contingency to cover thirty days of force majeure. The contractor may retain the option to treat a lengthy delay as a termination for convenience so as to free its work force for other undelayed, and therefore more profitable, work. Delays in obtaining governmental permits and approvals should also be specifically addressed, together with provisions relating to liability for any additional costs resulting from such delays.

Change Orders

Change orders, which plague many fixed-price construction projects, are not of the same level of concern in a cost-reimbursable project, as the owner agrees to pay the cost of the work, and it is recognized that changes will occur, at least to some extent.

In a fixed-price project, the issue of changes becomes of central concern. The scope of work must be sufficiently detailed, and the contractor's bid sufficiently unconditioned or clearly conditioned so as to provide a basis for future judgments about the reasonableness of requested change orders and time extensions. Whenever possible, estimated quantities should be arrived at for estimating purposes and accurate bid comparisons, and allowances on a unit price or actual price basis employed for change order purposes. Owners should, in their project budgets, realistically take into account anticipated change orders as if those allowances were projected costs. Fixed-price projects also demand considerably more contractor attention to changes and to contractual provisions relating to the timing and submittal of changes than do cost-reimbursable arrangements.

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Payments

Regardless of the nature of the contract, it is critical that payment terms and conditions be carefully drafted, retainage (if any) agreed on, any right to cease work or withhold payments clearly stated, and all payments to prime contractors arranged to avoid problems such as liens by subcontractors and vendors. Labor and material bonds provide the owner with

protection against unpaid vendors and subcontractors. Audit rights and the duty of the contractor to proceed despite the existence of a dispute regarding allowable costs must be included in the contract. Rights to offset against other contracts, and terms relating to joint checks, direct payments by owner to vendors or subcontractors, reimbursement for permits and taxes, and late payment charges should all be included as part of the agreement. Lien rights are also critical associated terms.

Insurance

Insurance provisions must be very carefully examined to assure that uninsurable risks are addressed and considered, and that appropriate insurance is purchased by appropriate parties so as to eliminate, to the maximum extent possible, the possibility of catastrophic uninsured losses. Attention must be directed to the use of additional insured status, primary coverages, and waivers of subrogation. Because of the possibility of very high casualty losses in projects that deal with hazardous substances, insurance provisions are extremely important to any remediation project. In some cases, no insurance is available for possible losses that result from contamination (which may be caused by the remediation work itself). The extent of protection afforded by insurance should be carefully evaluated.

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Performance Guarantees

In many instances, performance guarantees to assure adequate performance parameters are prudent additions to contractual terms when there is uncertainty as to the effectiveness of a process, or when a level of performance of a process is critical to the success of a project. For instance, is the bioremediation process guaranteed to remediate to a certain level? What is the remedy to the owner if it does not meet the performance standards?

Consequential Damages

Another area that demands specific attention in remediation contracts involving environmental risks is liability for consequential damages, which are damages that arise as a consequence of some occurrence, but that are not directly caused by the actions of the contractor—for example, circumstances in which a release of contaminants to the atmosphere could result in a “consequential” closure of a facility, and therefore business interruption. Consequential damages are very dangerous exposures for contractors, especially those that work in operating process or manufacturing facilities. With respect to environmental *consultants*, however, a broad waiver of consequential damages may have the same effect as a waiver of *all* damages, when the owner relies on a report and unknowingly purchases a contaminated property. Liability for contamination may be a consequence of a consultant’s error, and the existence of a consequential damages waiver may release the consultant from liability.

Differing Site Conditions

Differing site or underground conditions, such as unknown under-

ground obstructions or hazardous conditions, are a constant problem in remediation projects, and must be considered in both pricing and change order administration. Often it is not possible to fully evaluate or predict subsurface conditions before commencement of on-site work. The extent of the contractor's assumption of the risk of unknown subsurface conditions is a major contractual provision that should be clearly understood by both parties. The extent of the contractor's duty to inquire is of critical importance. The existence of substantial obstructions is of constant concern in remediation projects, and should be squarely addressed in the contract.

Reliance on Prior Work/Work of Others

The extent to which the contractor is entitled to rely on prior engineering or consulting studies or the work of others without verification should be stated in the contract. If the contractor is to be responsible for verifying the results of earlier studies, the tasks related to verification should be included in the scope of work.

Waste Disposal

Though contractors usually assist and advise owners on waste disposal options and pretreatment standards, it is unlikely that a knowledgeable contractor will agree to arrange for transportation or manifest waste shipments in its own name. The degree of the contractor's control over and responsibility for waste disposal and obtaining appropriate identification and tax numbers should be addressed in the agreement. This is particularly important due to regulatory requirements for timely waste disposal.

Communications with Agencies/Reporting Requirements

In most cases, owners will wish to preclude communications with or reports to agencies, to control information and provide centralized communications. The contract should provide that all contracts with governmental bodies or regulatory agencies must be made through the owner (or other designated party) except in the event of an imminent hazard or a legal obligation on the part of the contractor. Owners should consult with counsel whenever possible before submitting information to agencies.

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Indemnities

Indemnity issues are critically important to prudent contractual arrangement for environmentally-related work, and are intertwined with insurance issues.

Indemnities must be carefully drafted to assure that the intent of the parties is accurately reflected. The parties must have a realistic understanding of the sources for recovery should an incident occur. For example, it may be entirely unrealistic to believe that a contractor can honor its indemnification obligation if a high-cost uninsured loss occurs, such as contamination of a previously uncontaminated aquifer. Similarly, it is unrealistic to believe that comprehensive liability insurance will respond

to environmental damages.

In every instance, both parties should assess the extent to which the contract provides actual or only illusory protection against third-party (or even their own) claims. An indemnity is only as valuable as the assets or insurance of the party granting the indemnity, and those assets may or may not be available at the time of an occurrence. The terms of indemnities are among the most heavily negotiated provisions of contracts for environmentally-related services. There is no set pattern for liability apportionment.

It is critical that several discrete areas be addressed in an indemnity provision. These include liability to the owner and the owner's employees (including liability for the owner's existing property, which is already probably protected at least to some extent by property insurance); liability for the work in progress, goods and materials in transit, and contractor's equipment; liability to third parties; and liability for fines, penalties, and damage to natural resources. Negotiated terms should reflect a realistic apportionment, recognizing that prevention of occurrences is critical as the usual manner of risk spreading—insurance—is often unavailable.

The interplay among indemnity, insurance, and warranty provisions should also be carefully considered. Some indemnities provide warranty-like protection. Warranties are usually not covered by professional liability insurance. Further, due to the existence of state anti-indemnity statutes, choice of law provisions are critical to enforceability of indemnity provisions. The indemnity provisions are the most likely to be invalidated by state law, and the most likely to be held invalid. The best approach is to insert a "savings" provision, which requires renegotiation of invalidated terms to effect the original intent. This approach is addressed below.

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Severability

As mentioned above, the most likely provision of a contract to be declared invalid is the indemnity article. The party that is to benefit from an indemnity (in equitable contracts, both parties benefit to some extent) should insure that if a provision is held invalid, the parties are bound to renegotiate the agreement to insure that, to the maximum extent possible, the intent of the parties is realized. Such a "saving" severability clause preserves, insofar as possible, the intent of the contracting parties. In connection with indemnity, particularly, choice of law provisions are critical, due to the existence of "anti-indemnity" statutes in many jurisdictions which limit or invalidate indemnities under certain circumstances.

Incentives

As mentioned above, many owners provide incentives for achievement of certain performance parameters such as early completion or cost control. Bonus and penalty provisions, with set criteria for measurement of achievement, are often very attractive to both owner and contractor. Value engineering (rewards for good ideas), shared cost savings provisions, and additional fee provisions for late changes by owner (which are very disruptive, expensive, and conducive to oversights due to the

complexity of work completed) should all be considered as additional methods for proper incentive placement and enhanced performance by both parties. To be effective, incentives must be achievable. The contractor should also be compensated only for acceptable performance, to avoid shaving the work to achieve incentive goals.

Attorney's Fees

The parties should clearly understand the ramifications of attorney's fees provisions. Because owners sue contractors more than contractors sue owners, an attorney's fees clause in a contract provides a reduced level of protection to the contractor, and enhances the owner's remedies.

Exclusive Remedies

Exclusivity of remedies is one of the most misunderstood and overlooked provisions in contractual agreements. Generally speaking, if something goes wrong under a contract for professional or construction services, the injured party may sue in two different ways. First, it can sue for "breach of contract"—that is, to enforce the terms of the contract. Second, it can sue based on an allegation that the other party (usually the contractor) has been negligent—that is, that it has not performed in accordance with customary industry standards (i.e., the customary industry standard of performance for consultants, engineers, and contractors, barring some other standard set by statute or in the contract).

If a suit is brought based on negligence, instead of based on the contract, or based on both (which is more usual), the contractual protections may be held to be irrelevant to the suit for negligence. Unless the contract contains a clause that states that the remedies in the contract are exclusive and apply regardless of how a suit is styled, there might as well not be a contract, in some ways, because the liability-limiting provisions may be completely avoided by the way the action is brought. This means that without an exclusive remedies clause, the negotiated limitations on liability may not be upheld by a court. For a contract to be entirely enforceable (barring ambiguities or other issues that may affect its enforceability), the remedies must be stated to be exclusive (that is, no other remedies are available except those stated in the agreement) and the remedies and limitations in the agreement must apply whether liability is alleged in contract, negligence, or strict liability or under some other theory of law.

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Warranties/Liability for Rework

Owners are often not as sensitive to the issues of warranty as they should be, given the expense of correcting defects, particularly those in the field. A properly drafted warranty consists of three parts. First is the standard of performance. Unless otherwise stated, the standard that courts will read into a contract for engineering, consulting, or construction is that the contractor must perform in accordance with standards of care and diligence "customary in the industry." That is, the contractor's performance will be compared with other work performed by other contractors

performing similar services.

Second, the warranty should extend for a specific period of time, usually at least one year after completion or termination of the work. Note that warranties should commence *after* completion. In a fixed-price arrangement, errors made in the course of construction or engineering are paid for by the contractor, as part of the fixed price (contingency for errors is included in the bid). In a cost-reimbursable arrangement, the contractor passes on the cost of corrections during performance to the owner and such corrections are "fee bearing," meaning they are treated as part of the work. When a completion-type cost-reimbursable contract is used, the estimated effort for correction of defects must be factored into the hours of labor necessary for the work in order to arrive at an acceptable fixed fee level. In a cost-reimbursable level-of-effort contract, the labor hours for correction of defects should be factored into the estimated level of effort prior to fee adjustment. In cost-reimbursable arrangements, therefore, the owner pays for course-of-work corrections as part of the work; in fixed-price contracts, the owner pays the contingency in the fixed bid, whether or not the errors the contingency was meant to cover ever occur.

Note that it would be virtually impossible to administer a contract so as to "catch" errors (and make the contractor fix them for free or with non-fee-bearing labor hours) during performance of the work. The warranty period, therefore, should always begin after completion. A date or point certain for commencement—and termination—of warranty obligations should be set.

Third, the warranty must state a remedy if (1) the standard of care is breached and (2) that breach results in an error that is reported to the owner within the contractually set time frame. It is customary to require written notice of defects within a stated period of time.

The usual remedy is for the contractor to correct the defect. If the contractor is both the engineer/consultant and the contractor, liability is usually relatively clear. When there are separate entities performing engineering and construction (field work), disputes often arise as to who was at fault. The engineer will claim that the defect is due to errors in the field; the contractor will claim that an engineering error caused the field work to be misinstalled. Contracts for engineering should address the issue of who pays for field rework when an alleged engineering error results in field corrections. This is a heavily negotiated area, not capable of adequate discussion here. Suffice it to say that at a minimum, the engineering or consulting entity will in all likelihood demand an opportunity to examine the field work and will probably insist on some cost-sharing arrangement with the owner, to keep the incidence of finger-pointing down. Similarly, the contractor will want protection for its contingency in circumstances in which the engineering effort caused costly problems. The extent of contractor responsibility for defective vendor's goods and subcontractor errors should also be specifically addressed.

SELECTING CONSULTANTS/CONTRACTORS

It is critical to select environmental remediation companies carefully.

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The following are essential characteristics of an effective remediation contractor:

- Technical competence and an effective project management control system
- Experienced project managers
- Significant experience in similar work
- An understanding of the regulatory scheme and its requirements
- A good reputation and relationship with regulatory agencies
- Experience in engineering/construction at contaminated sites, when intrusive testing and actual remediation are to be carried out with the contractor's staff
- Experience in the relevant work, and a past working relationship with other entities performing work on the project, if subcontractors are to be used
- A sufficiently diverse or specialized assembly of skills for project performance, to avoid having to subcontract for essential services
- Backlog and availability of key personnel and a willingness to commit them to the project for the necessary periods (no "bait and switch")
- Experience in the geographic area
- A sufficient local presence
- Willingness to enter into a fair contract and accept some uninsurable risk
- Financial stability, insurability, bonding capacity

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The most effective method for selecting a consultant/contractor is to use "qualification criteria," which are go/no go thresholds by which to short-list the first cut of potential contractors. "Evaluation criteria," which are factors used to rank or evaluate the qualified bidders/proposers, are then used to make a final selection. Evaluation criteria are usually ranked or weighted by importance to allow an "apple-to-apple" comparison of competitive proposals.

CONCLUSION

Whether you are or represent an engineer, consultant, contractor, or owner, the risks inherent in environmental remediation projects should be apparent and of great concern. As with most complex issues, how the contractual risks are apportioned should be determined based on the facts of each project. Although there is no set pattern, the form of contract, with its opportunities for profit and risk assumptions, should dictate resolution of many issues. Uninsured, and perhaps uninsurable risk, such as the risk of exacerbated site conditions, should be among the most clearly addressed issues in any contract for environmental remediation.

Regardless of how you choose to resolve contractual issues, however, the most critical matter is to understand what you are getting into and what to expect if the worst happens. ■