

**SPECIAL RISK
ASSESSMENT ISSUE**

**Climate Change Risks:
What's in Your
Portfolio?**

**Managing EHS Risk in
Uncertain Times**

**EHS Governance in a
Global and Transparent
World**

Insights:

Hydrogen, Oxygen,
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Advanced Ecological Risk
Assessment Methods



*The Boston Fire Department
as a Risk Case Study. See page 6.*

Climate Change Risks: What's in Your Portfolio?

During the past few years, publicly owned corporations have come under increasing pressure to provide greater disclosure concerning potential risks they could face as a result of climate change. Just this past May, a group of investors representing more than \$4 trillion in assets wrote to hundreds of the world's largest corporations asking them to provide estimates of their greenhouse gas (GHG) emissions; identify on going mitigation actions; and specify their plans to avoid future risks associated with climate change.

Although most firms are still in various stages of developing a strategic response to climate change, many leading corporations already produce annual GHG inventories, and most of those firms have initiated steps to curtail their emissions or procure emission reduction credits by making investments in emission abatement activities. However, many firms find that quantifying the value of assets at risk due to climate change is a daunting task. Difficulties arise frequently in determining the general level of risks and overall quality of a portfolio of emission reduction projects. While individual GHG abatement projects might appear solid on the surface, often the full range of risks associated with these projects is not entirely clear.

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Managing EHS Risk in Uncertain Times

After the initial shock of 9/11, risk managers quickly asked themselves "Where do we go from here?" and "How do we get there?" Risk managers of companies handling hazardous materials have always faced the challenge of meeting regulatory requirements and industry guidelines.

At the same time, a rigorous competitive climate has driven many companies to restructure and downsize—including environmental, health, and safety (EHS) functions. For many businesses, these functions are being

asked to solve the age-old dilemma of doing more with less.

Following 9/11, risk portfolios were updated to reflect the current climate. Related questions, such as, "How much investment is appropriate and how do you justify the potential need for additional funding?" rapidly arose.

The answers to such questions lie in the systematic process of using the risk-based approach.

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Hydrogen, Oxygen, and Arsenic:

Getting Less from Your Drinking Water

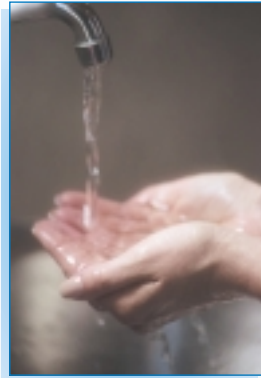
A glass of water is a simple thing. Turn the handle of any water faucet and glistening drops pour out. But what do you actually get?

In addition to quenching your thirst, you also get a handful of naturally occurring minerals, such as calcium, magnesium, aluminum—and arsenic.

Under the Safe Drinking Water Act, the U.S. Environmental Protection Agency (EPA) identifies and regulates contaminants in public drinking water. Arsenic concentrations in public drinking water have been associated with increased cancer risks—primarily for bladder, lung, and skin cancer.

The EPA retained ICF Consulting to compare possible maximum contaminant level standards for arsenic to the then current 50 parts per billion (ppb) standard.

ICF Consulting compiled arsenic concentration data supplied by 25 various state agencies into a single consistent format and analyzed it to determine the importance of location, water system type, source type (i.e., surface or ground water), and the population served in explaining



the variability of arsenic concentrations. One of the challenges of the analysis was dealing with high percentages of measured concentrations falling below the minimum value detectable by the laboratory instruments. To estimate these 'non-detects' for each water system, a probability plotting method was used to fit a statistical model to the rest of the measurements and then to estimate values to substitute for each non-detect.

Using these results, ICF Consulting developed estimates of the arsenic occurrence distribution and its uncertainties, so that EPA could estimate the numbers of systems with arsenic concentrations above various levels and the corresponding numbers of persons exposed.

EPA used this analysis to estimate the compliance costs for reducing arsenic concentrations to meet a new lowered standard and to estimate the associated health benefit. The new standard, 10 ppb, becomes effective in January 2006. Resultant health benefits will increase as water systems install the necessary treatments.

For more information about ICF Consulting's environmental risk assessment capabilities, please visit www.icfconsulting.com/risk

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Advanced Ecological Risk Assessment Methods

Site-specific environmental risk assessments are often complicated due to the significant uncertainties related to ecosystem functions and chemical interactions with the environment.

Identifying scientific problems related to specific projects, along with selection or development of the best, most applicable analytical methods is important in developing an efficient project approach and promoting overall project cost reduction.

ICF Consulting is supporting the United Nations Development Program and North Atlantic Treaty Organization (NATO) in assessing spatial disturbance and reuse options for former military sites. As a result of defense-related activities, large areas of valuable habitats within these sites were physically disturbed or contaminated by hazardous pollutants, including oil products and heavy metals, as well as by the Chernobyl Nuclear Power Plant accident.

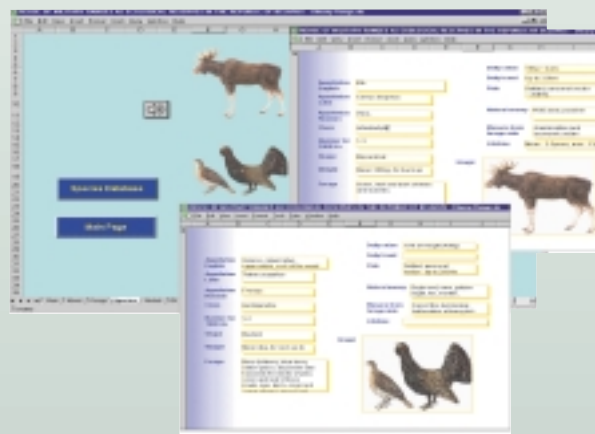
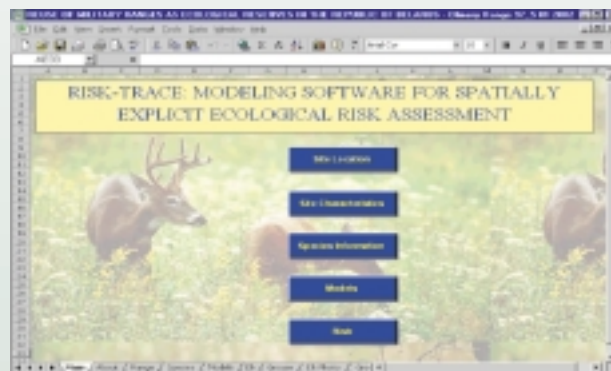
The military impact on such areas may not be wholly detrimental to the environment. Closure of the site to the public can result in environmental conservation of large portions of habitat. ICF Consulting is developing and integrating a number of risk and habitat assessment techniques into a comprehensive protocol to support policy decisions.

ICF Consulting uses a spatially explicit approach to ecological risk assessment, taking into account the typical size of the receptor's foraging area, the type of habitat that the receptor is attracted to, and the receptor's daily movements. Even under conservative assumptions, incorporating rational (i.e., data-driven) parameters in the exposure models results in significantly lower median health risks when compared to a spatially nonexplicit model. Probabilistic risk assessments often allow for a reduction in the degree of conservatism built into the analysis. In many cases, it could help to justify a better, site-specific policy decision.

An adaptive sampling approach combined with probabilistic and spatially explicit risk assessment techniques offers significant cost reductions and increased flexibility without the loss of scientific rigor.

Reuse of Military Ranges as Ecological Reserves

Modeling software designed for spatially explicit ecological risk assessment was developed to assist in reclaiming former military sites.



In many environmental projects, ICF Consulting implements dynamic work plans, paired with adaptive sampling and analysis strategies. These techniques are based on pre-established decision-making logic and incorporate field data and limited sample measurements to guide sampling/analytical efforts.

ICF Consulting has been working on developing framework for probabilistic risk assessment for the U.S. Environmental Protection Agency, the U.S. Army, and the U.S. Nuclear Regulatory Commission, as well as for private clients.

For more information, about ICF Consulting's environmental and risk assessment capabilities, please visit www.icfconsulting.com/risk

EHS Governance in a Global and Transparent World

Managing environmental, health, and safety (EHS) risks has become a relatively mature function. Most companies now recognize its importance and manage it as a business function—with a focus on increased efficiency, cost savings, risk reduction, and reputation management.

Many of the efficiencies gained in EHS management have occurred at a time when most large, multinational companies have experienced significant restructuring due to acquisitions, divestitures, or efforts to position the company for stronger competition and performance in the marketplace.

In this age of corporate transparency, it is not enough to simply inform stakeholders of limited company successes, improvements, or even persistent shortcomings and liabilities. Stakeholders (such as investors, business partners, nongovernmental organizations, and local communities) want actual improvements in the quality and consistency of performance.

In response to these demands, and to maintain the efficiencies gained in EHS management, many executives are focusing on creating global EHS governance practices. A sound EHS governance infrastructure should help a company maintain or enhance performance and demonstrates that the company is managing compliance, fulfilling its responsibilities to shareholders, and is prepared for new EHS requirements that may impact business in the future.

We all know that rules and regulations will not cover every situation. So how does a company determine if its EHS governance practices are sound? Based on ICF Consulting's work with companies around the world, there are several straightforward questions executives should consider to determine if their EHS governance practices are appropriate.

Is the current EHS management system being implemented consistently across the company, and is this system equivalent to prevailing industry practices?

Is the EHS audit program designed and implemented in a manner to communicate to senior management 'actual' performance across all operations? Do we really understand the basis of our EHS performance across all operations?



Is there an appropriate allocation of EHS resources (people and dollars) across the organization?

Is the company reporting performance in a manner that supports its external EHS global strategy position?

Is the company communicating with stakeholders in a consistent fashion? Does the company know who its key or evolving stakeholders are?

Does the company's EHS strategy incorporate global climate change practices, evolving environmental stewardship practices, and social responsibility programs?

To answer those questions, ICF Consulting recommends that companies gather objective and detailed information and benchmark the information against industry best practices following the process outlined below. The purpose is to develop an understanding of internal and external governance practices with sufficient clarity and reliability to make effective decisions about where change may be needed.

Assessing EHS Governance Practices



Step 1: Assess existing practices through systematic interviews with key managerial and operational staff across all operations. Visit selected sites to get a “feel” for how practices are implemented, measured, and reported. The goal is to identify key factors impacting EHS performance and EHS management system efficiencies.

Step 2: Complete an analysis to compare existing practices against industry norms relative to peer companies. Compare EHS and social accountability management and performance, internal communication systems, and stakeholder dialogue programs. Comparative analysis provides a benchmark as to how other organizations are designing and implementing EHS practices. This allows companies to determine points of differentiation and leverage.

Step 3: Communicating with nongovernmental organizations is optional but highly recommended for organizations within the resources, energy, and chemical industries. Assess “global opinions” to determine issues important to those organizations.

Step 4: The final step is to formulate and implement actions to improve existing practices. Operationalize EHS—incorporate it into the way business is conducted on a daily basis. Improve the effectiveness of EHS management in line with best industry practices and align available resources with the company’s EHS strategy and regional focus.

EHS governance is not a new issue; however, it clearly has reemerged as a key stakeholder concern in light of the questionable accounting and business practices that have marked this past year.

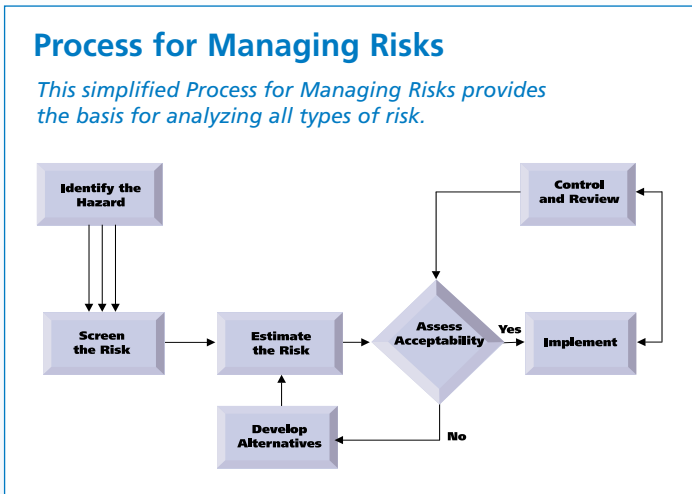
ICF Consulting has identified a number of best practices, as well as “middle of the road” practices, within the field. How does your company compare? Use the chart below to rate your EHS practices.

For more information about ICF Consulting’s EHS capabilities, please visit www.icfconsulting.com/EHS

Common EHS Governance Practices		
Leading Governance Best Practices	Lagging/Middle of the Road Practices	Company Rating
Executives and staff directly involved in developing and implementing the governance strategy agree on the issues that will drive the strategy and share a vision of the general direction in which EHS should head.	There are no formal or informal governance strategy documents, or if they do exist, they were the work of a few individuals and do not have broad company buy-in.	Established EHS governance strategy: __Yes __No
The audit program is implemented in a manner such that the resources necessary both to identify and, more importantly, to resolve problems have consistently been made available, with the result that the number and severity of audit findings continues to decrease over time. Corporate management demonstrates this commitment by its attention to repeat or unresolved audit findings.	The audit program is being implemented but may not consistently provide clear and objective information about performance year in and year out.	Senior management demonstrates a high degree of commitment to the audit program: __Yes __No
EHS programs have clear and demonstrable track records and external certifications. There are formal corporate EHS standards .	There are policies and guidance that address compliance with specific EHS laws. There are no formal corporate EHS management standards.	External attestations have been made regarding the formality of corporate EHS standards and programs: __Yes __No
Significant and consistent efforts have been taken to streamline but effectively manage risks within heavy industry, such as chemicals, energy, and resources through the development of risk management tools, retaining corporate memory, and creating internal circles of excellence to tap internal experts.	Efforts to manage risks are ad hoc and procedures are inconsistently implemented across the company. The operations are not specifically required to conduct periodic risk assessments.	EHS risks are being managed effectively and consistently across the organization: __Yes __No
The line organization drives EHS management, and individual managers behave as if EHS management is their personal responsibility. A formal performance management system for line managers addresses EHS performance. Corporate vs. business unit (or plant) roles and line vs. staff roles are well defined and well understood, and they are being implemented as defined.	Responsibilities for managing stakeholders and communicating to senior management have become somewhat diffused with acquisitions and in embedding EHS into the line organization.	The performance management system clearly includes EHS responsibilities: __Yes __No
Emerging EHS issues/risks are considered as part of the business strategic planning process. Industry/trade associations have been effectively leveraged and there is good coordination across all relevant parts of the company. Issues are identified across the entire product life cycle and have been managed to the clear benefit of the company.	Relevant issues/risks are discussed within the EHS staff function, and to an increasing degree among line management and company executives. For example: the company is in the process of understanding and quantifying its greenhouse gas (GHG) emissions; sustainable development is a well-understood concept but not yet operationalized.	Formal systems are in place for identifying and managing EHS issues/risks: __Yes __No __In progress
The EHS metrics and targets are well aligned with the company’s risk profile, policy and business strategy. As a result, they allow management to obtain a comprehensive picture of EHS performance.	EHS metrics are, for the most part, still focused heavily on compliance-related EHS performance metrics instead of issue-driven (e.g., GHG emissions) or corporate brand-driven (e.g., sustainability).	EHS metrics and targets reflect the external positioning of the company and are aligned with risk profile: __Yes __No __For some, but not all metrics
There are explicit processes for identifying and engaging key stakeholders in regular two-way dialogue.	Engagement with external stakeholders is at the individual initiative of field personnel. Information provided externally reflects what the company wants external stakeholders to know.	Established processes are in place for engaging in consultation with key stakeholders: __Yes __No __Sometimes

Managing EHS Risk in Uncertain Times (cont. from page 1)

Hazard Identification is the first step in capturing events that could compromise the process, the facility, or the area of interest. Useful methodologies for hazard identification and documentation include the Preliminary Hazard Analysis and the “What if?” method.



Consequence Analysis is important to estimate the magnitude of the event, e.g., thermal radiation, vapor dispersion, and associated impact on life safety, property damage, and/or business interruption.

Frequency Estimation characterizes the likelihood of the event or interrelated events. Fault tree analysis is a useful methodology for this purpose.

Risk Prioritization is based on the likelihood of occurrence and potential consequences, as illustrated in the Risk Analysis matrix to the right.

Risk Acceptability provides the foundation for decision making on implementing cost-beneficial mitigation measures and investments in emergency response and business continuity contingency planning.

Risk Management Procedures Post-9/11: A Case Study

One of the many organizations reexamining its risk management procedures in the wake of 9/11 was the Boston Fire Department.

The Department immediately revisited the risks associated with the transport of liquefied natural gas (LNG) through Boston Harbor and in contiguous areas where the impact of an event could affect the City of Boston. Relied on as

a source of energy for the New England region, LNG has been transported through the port of Boston regularly since 1971.

As risk-related concerns were revisited, some events previously considered low probability/high consequence now had a higher likelihood. One of the many actions taken by the Boston Fire Department was to focus on improvements to the risk management of LNG release/fire events. This was particularly important as the consequences of a fire event could impact densely populated areas of the city.

The Boston Fire Department turned to ICF Consulting’s EHS Management practice (formerly ADL Global Environment and Risk—Americas) for assistance. ICF Consulting’s efforts included outreach to interested parties at all levels, as well as reviewing risk management plans and identifying any potential gaps or conflicts. More sophisticated Standard Operating Procedures also were developed, including a dynamic response plan based on a conceptual decision tree that incorporates “real time” consequence assessment when responding to a fire event. Such an approach sharpens the technical focus of the response operations, which in turn minimizes risk and increases cost-effectiveness. For example, an estimate of the anticipated thermal radiation from a pool fire event is of critical importance when making decisions on evacuation zones.

Risk Analysis

		CONSEQUENCE			
		Minor	Serious	Extensive	Catastrophic
LIKELIHOOD	High	C	B	A	A
	Moderate	C	B	B	A
	Low	D	C	B	B
	Very Low	D	D	C	C

While risk management was critical to life safety, property protection, and businesses prior to the attacks, its importance cannot be overemphasized in today’s uncertain times.

For information on ICF Consulting’s safety and risk management capabilities, visit www.icfconsulting.com/EHS.

Calendar of Events

October

October 23, 2002

London, United Kingdom. ICF Consulting's Abyd Karmali will speak on "Strategic Implication for European Power Generation Sector from Greenhouse Gas Emissions Trading" at the **Carbon Market and the City of London's Global Role Conference**. *For more information, please contact Sue Demmon at +44.20.7554.8730.*

October 29-30, 2002

College Station, Texas. ICF Consulting is a sponsor of the annual **Mary Kay O'Connor Safety Symposium**, as well as an exhibitor. Topics this year range from regulatory issues and hazard assessment to consequence modeling and process safety management. The objectives of the symposium are to share ideas, tools, and technology relating to safety in industry, as well as to increase the overall awareness of safety. W. Hunter Hild will moderate tracks on "Safety Integrity Levels," "Hazard Assessment & Risk Management," and "Risk Assessment." *For more information, please contact Marian Long at 1.781.676.4054.*

November

November 3-6, 2002

Toronto, Ontario. ICF Consulting's Francois Cote will present a paper entitled "Thinking Outside the Atmosphere" at the **Canadian Society of Safety Engineering (CSSE) Professional Development Conference**. *For more information, please contact Francois Cote at 1.416.341.0387.*

November 13-15, 2002

Charlotte, North Carolina. ICF Consulting will exhibit at the **Brownfields 2002 "Investing in the Future" Conference** as well as present several papers. The following representatives from ICF Consulting will speak on various topics throughout the conference:

Robert Hegner will speak on "Institutional Controls: What's Working? What Isn't? Examples of Successes and Failures at 16 U.S. Sites."

David Levy will present a "Study of HUD's Site Contamination Policies."

Igor Linkov will lecture on "Spatially Explicit Risk-Based Approaches for Assessing Environmental Value and Reuse Options of Brownfield Sites."

William Schroeer will speak on "Comparing Methodologies to Assess Transportation and Air Quality Impacts of Brownfields and Infill Development." *For more information, please contact Anne Torgler at 1.703.218.2772.*

November 16-20, 2002

Salt Lake City, Utah. Igor Linkov of ICF Consulting will lecture on the "Use of Risk Assessment in the Mining Industry" at the **Society of Environmental Toxicology and Chemistry (SETAC) Annual Meeting**. *For more information, please contact Igor Linkov at 1.781.676.4053.*

November 18-19, 2002

Washington, DC. Elliot Roseman of ICF Consulting will speak on "Financial Consequences and Changing Liabilities in the Migration to Standard Market Design and RTOs: High-Level Policy and Case Study" at the **Responses to the NOPR on Standard Market Design Conference**.

For more information, please contact Sheila Hudson at 1.703.934.3181.

November 18-19, 2002

New York, New York. Judah Rose of ICF Consulting will speak on "The Merchant Power Market—Where Do We Go From Here?" at the **4th Annual Financing U.S. Power Projects Conference** to be held at the Grand Hyatt New York. *For more information, please contact Sheila Hudson at 1.703.934.3181.*

November 18-19, 2002

London, United Kingdom. ICF Consulting's Neil Cornelius will speak on "Valuing Renewable Energy Certificates in Different European Energy Markets" at the **Environmental Finance Conference on Renewable Energy Certificates 2002: Latest Developments in Trading Green Power**. *For more information, please contact Sue Demmon at +44.20.7554.8730.*

December

December 8-11, 2002

New Orleans, Louisiana. Igor Linkov of ICF Consulting will speak on the "Use of Bayesian Techniques in Risk Assessment" and chair the Ecological Risk Assessment Specialty Group Business Meeting at the **Society for Risk Analysis Annual Meeting**. *For more information, please contact Igor Linkov at 1.781.676.4053.*



powered by perspective

Climate Change Risks: What's in *Your* Portfolio? (cont. from page 1)

A rapidly growing electric power company conferred with ICF Consulting to better understand their risk exposure and quantify the impacts of climate change on the firm's asset values. Part of the risk analysis involved evaluating its portfolio of more than 30 emission reduction projects. Many projects were the result of past mergers and acquisitions and the current environmental managers were uncertain how to quantify the value of the estimated emission benefits.

ICF Consulting used its proprietary analytical tool *GHGPortfolio*[™], a rating system based on specific and highly stringent evaluation criteria, to analyze this client's portfolio of projects. The evaluation criteria capture key factors identified internationally as essential to ensuring that GHG emission reduction projects have the greatest probability of generating net environmental benefits. The criteria focus on elements critical to (a) acceptance into voluntary programs, (b) eligibility for early action credit, or (c) creation of marketable emission reduction credits. Among the attributes are baseline determination, direct and indirect emission impacts, monitoring and verification procedures, information management systems, and legal entitlement to emission reduction benefits.

Using *GHGPortfolio*, ICF Consulting rated and ranked all of the client's projects and provided an overall rating for the entire portfolio of GHG abatement projects. The results gave the client a clear indication of the strengths and weaknesses exhibited by its projects. For example, the portfolio contained several renewable energy projects undertaken in partnership with different civic and voluntary groups. Despite the fact that these projects were clearly generating emission reduction benefits, they received relatively low scores. This was due in part to inadequate monitoring, verification, and record-keeping procedures and in part to the fact that the client did not have clear legal entitlement to the emission reductions. Correcting those shortcomings is not only feasible but will significantly increase the value of the company's projects.

The risk management approach used by ICF Consulting enabled identification of several correctable weaknesses across the portfolio. For example, because project activity

records were maintained at the facilities where projects originated, data on more than half of the projects were difficult to obtain, often inconsistent across similar types of projects, and in a few cases, very outdated. All of these factors suggest the need for a centralized data management system that individual business units could access to provide consistent and timely information.

By bringing analytical rigor to the evaluation of how *real*, *measurable*, and *quantifiable* GHG emissions reductions might be in a carbon-constrained future, ICF Consulting was able to recommend specific actions the power company could take to enhance the value of its existing portfolio of emission reduction projects. ICF Consulting also provided guidance on opportunities for expanding several activities to cover more of their service area and developed a "checklist" to guide the power company's future investments in GHG mitigation activities.

For more information on ICF Consulting's emission management capabilities, please visit www.EmissionStrategies.com

About ICF Consulting

ICF Consulting is a leading management, technology, and policy consulting firm. Drawing upon its extensive industry knowledge, credentialed professionals, and innovative analytics, it develops solutions to complex energy, environment, emergency management, community development, and transportation issues. ICF Consulting's approach to these issues is strengthened by its expertise in information technology, organizational improvement, program management, and communications. Since 1969, ICF Consulting's 1,000 employees have served major corporations, government at all levels, and multinational institutions from key business centers in North America, Europe, and Asia.

ICF Consulting recently acquired two major consulting divisions of Arthur D. Little, Inc. (ADL). These divisions center on environment, risk, and public sector program management and add important new dimensions to ICF Consulting's existing competencies.

For more information on ICF Consulting's services, please visit our Web site at www.icfconsulting.com.

We welcome your comments and suggestions. Please contact us at 1.703.934.3659 or by e-mail at perspectives@icfconsulting.com.

