

January 7, 2005

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 70-3103
LOUISIANA ENERGY SERVICES, L.P.	)	
	)	ASLBP No. 04-826-01-ML
(National Enrichment Facility)	)	

NRC STAFF TESTIMONY OF RICK NEVIN CONCERNING  
NUCLEAR INFORMATION AND RESEARCH SERVICE AND PUBLIC CITIZEN  
ENVIRONMENTAL CONTENTION 7 ("NIRS/PC EC-7")  
(NEED FOR THE FACILITY)

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Q1. Please state your name, occupation, and by whom you are employed.

A1. Rick Nevin

Consultant

ICF Consulting

Q2. Please describe your education and experience related to (professional expertise).

A2. B.A. in Economics and Mathematics and M.A. in Economics awarded by Boston University in 1980 (Accelerated M.A.-B.A. Program); Masters in Management with concentrations in Finance, Managerial Economics, and Strategy from Northwestern University in 1984.

I have 25 years of experience conducting and managing financial, economic, and environmental risk analyses, including 17 years with ICF Consulting where I have provided analysis for the Nuclear Regulatory Commission (NRC), the Environmental Protection Agency (EPA), the Department of Housing and Urban Development (HUD), the Department of Energy (DOE), the President's Task Force on Environmental and Safety Risks to Children, and a number of trade organizations and other private sector clients. A statement of my professional qualifications is attached.

Q3. Please describe your current job responsibilities.

- A3. I am currently a Vice-President with ICF Consulting where I am responsible for conducting and managing analytical projects for public and private sector clients.
- Q4. Please describe your role duties with regard to the NRC's Draft Environmental Impact Statement for the proposed national enrichment facility to be constructed and operated in Lea County, New Mexico.
- A4. ICF Consulting did not prepare the Draft Environmental Impact Statement (DEIS), but I have reviewed the portion of the Environmental Report (ER) prepared by Louisiana Energy Services (LES) for the proposed National Enrichment Facility (NEF), the portion of the DEIS relating to need for the NEF, documents cited in both the ER and the DEIS as relevant to those sections, as well as additional information relating to the subject of the market for enrichment services within the United States and throughout the world.
- Q5. What is the purpose of your testimony?
- A5. The purpose of this testimony is to provide the Staff's views concerning NIRS/PC contention EC-7 regarding the adequacy of the discussion of the need for the proposed facility in the ER and the DEIS
- Q6. Are you familiar with Contention EC-7?
- A6. Yes, Contention EC-7 states:

Petitioners contend that the Environmental Report (ER) does not adequately describe or weight the environmental, social, and economic impacts and costs of operating the National Enrichment Facility (See ER 1.1.1 et seq.) in that:

- (A) Louisiana Energy Services, L.P.'s (LES) presentation erroneously assumes that there is a shortage of enrichment capacity
- (B) LES's statements of "need" for the LES plant (ER 1.1) depend primarily upon global projections of need rather than projections of need for enrichment services in the U.S.
- (C) LES has referred to supply and demand in the uranium enrichment market (ER 1.1) but it has not shown how LES would effectively enter this market in the face of existing and anticipated competitors and contribute some public benefit.

Q7. What did you do to prepare for this testimony?

A7. I reviewed the following documents, in whole or in part, as applicable:

- The NRC DEIS
- Energy Information Agency (EIA) forecasts
- World Nuclear Association (WNA) forecasts, and
- The NEF Environmental Report

Q8. Did LES in the ER evaluate the relative supply and demand for enrichment services and, if so, what conclusions did it reach?

A8. The ER evaluated global enrichment services forecasts through 2020, and concluded that supply and demand “are in very close balance after 2010, emphasizing the need for all supply sources, including the proposed LES and USEC centrifuge enrichment plants in the U.S.” (LES Environmental Report for the National Enrichment Facility, rev. 3, September 2004, p. 1.1-15, attached as Staff Exhibit 1) (“ER”). The forecast supply from the LES NEF and the American Centrifuge Plant (ACP) that USEC has proposed based on “schedules that have been announced by each company” (ER, p. 1.1-13), anticipating that both facilities would begin production in 2008 to 2009 and reach full capacity in 2012 to 2013 (ER, p. 1.1-14 & Table 1.1-5).

Q9. Does the ER provide a basis for concluding that a shortage of enrichment capacity exists?

A9. The ER conclusion that there would be a capacity shortage after 2010 without the NEF is based on LES demand forecasts consistent with EIA demand forecasts, and a supply forecast based on an analysis of current and potential future sources of uranium enrichment services. The forecast for enrichment services demand is supported by underlying forecasts for nuclear generation capacity through 2020, and the supply forecast reflects current sources of supply and announced plans for new enrichment facilities and planned closures of older facilities.

Q10. What information did the applicant rely upon in reaching its conclusions regarding the

supply and demand for enrichment services?

- A10. In the ER, with respect to demand, the applicant compared EIA and WNA forecasts for United States and world nuclear generation capacity through 2020 with its own forecasts, and also compared applicant, EIA, and WNA forecasts for domestic and global enrichment services demand through 2020. (ER, Figures 1.1-1 through 1.1-5).

The ER supply forecast included supply through 2020 from the proposed NEF, the ACP that USEC has proposed to build in Ohio, other existing and planned facilities using centrifuge technology, the gradual loss of supply from old diffusion technology facilities, and the continuation of enrichment services obtained by blending down Russian weapons grade highly enriched uranium (HEU) (ER, pp. 1.1-8 through 1.1-15, Table 1.1-5, and Figure 1.1-7). USEC has proposed building the ACP to fulfill terms of an agreement with the U.S. Department of Energy (DOE) that calls for USEC to deploy an advanced technology enrichment plant by 2011 (DOE Press Release, "DOE Inks Agreement to Ensure Domestic Uranium Enrichment Capacity is Maintained", June 18, 2002, attached as Staff Exhibit 2). The LES ER supply forecast anticipates that USEC proceeds with its announced plans to replace its Paducah facility with the ACP. The ER forecast also anticipates that Eurodif proceeds with its announced plans to replace its aging diffusion technology facility in France with a new centrifuge facility. The ER supply forecast also anticipates that the Russian HEU agreement, which expires in 2013, will be extended to provide the same annual supply through 2020 (ER, pp. 1.1-8 through 1.1-15, Table 1.1-5, and Figure 1.1-7).

- Q11. Are WNA and EIA forecasts generally accepted as reliable indicators in the industry?

- A11. The WNA is an industry organization whose members are responsible for 90% of world uranium enrichment production, and 90% of world nuclear-generated electricity outside the USA. The EIA is a statistical agency of the DOE that provides policy-independent energy data, forecasts, and analyses. WNA and EIA forecasts for nuclear markets are widely cited

and accepted as the best available indicators for industry demand. The highly regulated, capital intensive nature of the nuclear power industry means that the underlying LES forecast for nuclear generation capacity through 2020 is almost entirely based on power plants that are currently in operation, under construction, or firmly planned (ER, Figure 1.1-1). The highly regulated, capital intensive nature of enrichment services supply also means that enrichment supply forecasts are similarly based on facilities currently in operation, under construction, or firmly planned.

Q12. In your opinion, does the ER represent a reasonable projection of future supply and demand for enrichment services based on current indicators?

A12. Yes. In fact, the ER forecast for a very close balance of supply and demand after 2010 suggests that there is some risk of a supply shortfall even with the NEF.

The ER forecasts for world nuclear generation capacity and enrichment services demand were very similar to the EIA forecasts, but the ER and EIA forecasts for 2020 were about 10% below WNA forecasts (ER, Figures 1.1-3 & 1.1-4). The higher WNA forecast for enrichment services demand is consistent with the higher WNA forecast for world nuclear generation capacity, and lower ER and EIA forecasts for nuclear generation capacity reflected conservative assumptions with respect to additional new nuclear power capacity. The EIA has subsequently increased its forecast for 2020 world nuclear generation capacity by about 5% (Energy Information Administration, International Energy Outlook 2004, Projections of Nuclear Generating Capacity, 2004, attached as Staff Exhibit 3) ("IEO 2004"). Therefore, the LES demand forecast used in the ER is actually conservative relative to the WNA enrichment services forecast and to the revised EIA forecast for nuclear generation capacity.

The ER supply forecast is reasonable based on announced plans to build new centrifuge facilities and to close old diffusion facilities that are not cost-competitive with centrifuge technology (ER, Table 1.1-5 and Figure 1.1-7). The supply forecast also anticipates that the US will continue to get enriched uranium through the Russian HEU agreement through 2020 even though the current HEU agreement expires in 2013 (ER, Table 1.1-5 and Figure 1.1-7). An extension of the HEU agreement through 2020 is a reasonable assumption, but the ER forecast for a very close balance of enrichment services supply and demand after 2010, including Russian HEU supply after 2013, indicates that any reduction in Russian HEU supply after 2013 could shift the close balance after 2010 to a supply shortfall.

The ER represents a reasonable projection of future supply and demand for enrichment services based on available indicators, but the combination of the conservative ER demand forecast and the risk of any Russian HEU supply reduction after 2013 indicate that there could actually be a global supply shortfall after 2010 even with the NEF.

Q13. Did the Staff evaluate the relative supply and demand for enrichment services and, if so, what conclusions did the Staff reach?

A13. The DEIS showed that domestic demand for enrichment services exceeds domestic supply, indicating a need for additional domestic supply, especially in the context of the projected balance of global supply and demand (U.S. Nuclear Regulatory Commission, Draft Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico, p. 1-4, 2004, attached as Staff Exhibit 4) ("DEIS").

Q14. In performing its evaluation, did the Staff rely wholly on the information in the ER?

A14. No. Chapter 1 of the DEIS explicitly compares the LES projections from the ER with EIA projections, and references cited at the end of that chapter identify several other information sources reflected in the needs assessment (DEIS, pp. 1-3 through 1-5, and 1-19 through

1-21).

Q15. What information did the Staff use to inform its conclusions with regard to the need for enrichment services now and in the future?

A15. The DEIS Chapter 1 References include the following sources related to the needs assessment.

- ! Blake, M.E. "U.S. Capacity Factors: Still on the Rise." *Nuclear News*, pp. 25-29.
- ! U.S. Department of Energy. "Nuclear Power 2010." Nuclear Power Systems, Office of Nuclear Energy, Science and Technology. January 26, 2003.
- ! Energy Information Administration. "Annual Energy Outlook 2004 (Early Release)." U.S. Department of Energy. December 16, 2003.
- ! Energy Information Administration. "Uranium Industry Annual 2002." DOE/EIA-0478 (2002). U.S. Department of Energy. May 2003.
- ! Energy Information Administration. "U.S. Nuclear Fuel Cycle Projections 2000-2025." U.S. Department of Energy. January 2003.
- ! Energy Information Administration. "Uranium Marketing Annual Report." U.S. Department of Energy. (Released May 28, 2004; last modified June 30, 2004).
- ! Energy Information Administration. "Annual Energy Outlook 2004 with Projections to 2025." DOE/EIA-0383 (2003). U.S. Department of Energy. January 2004.
- ! Louisiana Energy Services. "National Enrichment Facility Environmental Report." Revision 2. NRC Docket No. 70-3103. July 2004.
- ! National Energy Policy Development Group. "National Energy Policy." May 2001.
- ! U.S. Nuclear Regulatory Commission. "Fact Sheet on Power Upgrades for Nuclear Plants." Washington, D.C. March 12, 2004.
- ! United States Enrichment Corporation. "USEC 2002 Annual Report." Bethesda, Maryland. 2002.
- ! United States Enrichment Corporation. "USEC, TENEX Mark 10' Anniversary of Megatons to Megawatts Program." News Release. January 14, 2004.

Q16. In your opinion, are the references used by the Staff in determining the supply and demand for enrichment services reliable indicators?

A16. Yes. As in the case of the ER, the demand forecasts are widely cited and accepted indicators for industry demand, and supply forecasts are based on current sources of supply and facilities under construction or firmly planned.

Q17. In your opinion, does the DEIS contain a reasonable projection of enrichment supply and demand based on current industry indicators?

A17. Yes.

Q18. Are the conclusions reached by the Staff consistent with those reached in the ER? Please explain any differences.

A18. Yes. The DEIS showed that EIA and LES domestic demand projections “were generally consistent” (DEIS, p. 1-4) and EIA and ER global demand projections are also similar (ER, Figures 1.1-4). The DEIS especially highlighted the shortfall of domestic supply relative to domestic demand and the need for additional domestic supply “to ensure national energy security” (DEIS, p. 1-4), but also considered the implications of this domestic forecast in the context of global forecasts for installed nuclear-generating capacity that “suggest a continuing demand for uranium enrichment services both in the United States and abroad.” (DEIS, p. 1-3). In particular, the DEIS compared LES and EIA projections for US demand (DEIS, Table 1-1), and referenced a 2002 letter to the NRC from the Department of Energy describing how domestic market supply is now less than half of domestic market demand and estimating that domestic supply could amount to just 20% of domestic demand by 2020 (DEIS, p. 1-3).

An exclusive focus on domestic supply and demand projections clearly supports the conclusion that there is a need for the NEF facility, but global supply and demand projections also provide context for assessing the significance of the domestic supply shortfall. The ER forecasts a close balance of global supply and demand after 2010 even with the NEF, based on a demand forecast that is conservative relative to the WNA enrichment services forecast and a revised EIA forecast for nuclear generation capacity (ER, Figure 1.1-4; IEO 2004). The substantial shortfall of domestic supply versus domestic demand as demonstrated in the DEIS indicates that the domestic market would be especially vulnerable to any unforeseen global supply shortfall.



Q19. Based on your review of the information relating to supply and demand for enrichment services, do you have an opinion regarding the ability of LES to enter the uranium enrichment market?

A19. The projected supply and demand for enrichment services, as well as the industry experience of LES partners, indicates that LES will be able to enter the market for enrichment services.

Q20. How did you reach that conclusion?

A20. The global projections for supply and demand indicate the need for another centrifuge technology facility to satisfy world demand as old diffusion facilities continue to close, and domestic supply and demand projections indicate that the domestic market is especially vulnerable to any global supply shortfall. The LES partners clearly have the industry knowledge and experience to enter the domestic enrichment market as Urenco already operates three enrichment facilities in Europe, Westinghouse Electric Company is a leader in nuclear reactor technology, and Duke Power, Entergy and Exelon operate a number of domestic nuclear reactors. (“National Enrichment Facility”, <http://www.nefnm.com/pages/about.php>, 2004, attached as Staff Exhibit 5; Duke Power, “About Us: Nuclear Power Plants”, <http://www.dukepower.com/aboutus/plants/nuclear>, 2004, attached as Staff Exhibit 6; Entergy, “Welcome to Entergy Nuclear”, <http://www.entergy-nuclear.com/Nuclear/>, 2004, attached as Staff Exhibit 7; Exelon, “Power Generation”, [http://www.exeloncorp.com/generation/nuclear/gn\\_nuclear.shtml](http://www.exeloncorp.com/generation/nuclear/gn_nuclear.shtml), 2004, attached as Staff Exhibit 8). Moreover, LES has already announced signed contracts with U.S. nuclear energy companies to take deliveries amounting to 50% of the first ten years of NEF production. (LES Press Release, “LES Announces First Round of Signed Contracts”, December 10, 2003, attached as Staff Exhibit 9).

Q21. Can you predict with any degree of certainty whether LES may be able to enter the uranium enrichment market?

A21. The fact that Urenco operates enrichment facilities in Europe, and LES partners include power companies that operate domestic nuclear reactors, indicates with a very high degree of certainty that LES can “enter the market” in the sense that it has the technical and industry expertise to finance, build, and operate an enrichment facility, and the domestic market knowledge to sell its product. In fact, one could argue that LES has already “entered the market” in the sense that it has already signed contracts for its enrichment services.

Q22. Does this conclude your testimony?

A22. Yes.

## **Rick Nevin**

**ICF CONSULTING**

### **Education**

- 1984 M.M. (Master of Management), Concentrations in Finance, Managerial Economics, and Strategy (Dean's List in every academic period), J.L. Kellogg Graduate School of Management, Northwestern University
- 1980 M.A., Economics, Boston University, Accelerated M.A./B.A. Program
- 1980 B.A., Economics and Mathematics, Boston University, awarded with Distinction (Distinction Thesis on the Economics of Inventive Output)

### **Experience**

Mr. Nevin is an ICF Vice-President with 25 years of experience conducting and managing financial, economic, and environmental and health risk analyses for the Nuclear Regulatory Commission (NRC), the Environmental Protection Agency (EPA), the Department of Housing and Urban Development (HUD), the Department of Energy (DOE), the President's Task Force on Environmental and Safety Risks to Children, and a number of trade organizations and other private sector clients. Mr. Nevin is also the author of peer-reviewed studies on the market value impact of residential energy efficiency and on gasoline lead impacts on crime trends.

- G** Legal, Financial, and Market Analysis of Nuclear Fuel Venture. For the NRC, Mr. Nevin analyzed proprietary documents related to the ConverDyn joint venture to market nuclear fuel including legal agreements for the joint venture and financial and market forecasts submitted to demonstrate a funding plan for decommissioning. Mr. Nevin reviewed legal documents to ascertain the terms of the joint venture relationship, compared financial and market forecast assumptions with independent market forecasts by DOE and other available data to assess the reasonableness of nuclear fuel sales forecasts, and prepared a sensitivity analysis of financial forecasts, quantifying the cost and revenue changes associated with almost a dozen different scenarios for alternative market and financial assumptions.
- G** Expert Witness Valuation Analyses. For the NRC, Mr. Nevin analyzed proprietary Safety Light documents related to a plan to sell assets from its United States subsidiary and NRC licensee to a foreign affiliate. Mr. Nevin prepared written expert witness testimony disputing the assigned value of the asset transfer and highlighting the risk that the licensee could be left with insufficient funds for decommissioning, while Safety Light could benefit from the sale of undervalued assets to a foreign affiliate unencumbered by NRC legal claim.
- G** Expert Witness Damage Assessment Analysis. In support of a law firm defending a public utility, Mr. Nevin provided expert analysis related to his research in *The Appraisal Journal* on the market value impact of fuel bills and home energy efficiency. This research was cited as a basis for quantifying damages to homeowners participating in a utility program that offered lower electricity rates as an additional incentive for energy efficiency investments, and the legal dispute related to the offer on lower rates. Without addressing that issue in dispute, Mr. Nevin's analysis showed that a correct application of his research indicated that participating homeowners had realized higher home values plus net cash flow savings from energy efficiency relative to homeowners who had not participated in this program, indicating that there was no basis for any monetary damages to participating homeowners.

- G** Cost and Failure Risk of NRC Financial Assurance Mechanisms. Mr. Nevin developed a quantitative methodology for comparing the risk of failure to honor NRC financial assurance obligations covered by alternative mechanisms (e.g., trust fund, surety bond, standby letter of credit, insurance, and parent-guarantee and self-guarantee with and without a financial test). This analysis quantified and compared the public costs of each mechanism (based on failure risk analysis) and private costs (based on estimated costs of third-party financial assurance).
- G** Federal Strategy for Eliminating Childhood Lead Poisoning: For the President's Task Force on Environmental Health Risks and Safety Risks to Children, Mr. Nevin developed analysis and text for the technical appendix that combined analysis of National Health and Nutrition Examination Survey data on childhood blood lead levels, and American Housing Survey data on temporal changes in the housing stock, in order to develop baseline projections for the number of children with elevated blood lead, with and without federal intervention.
- G** Solid Waste Management Market Analysis for EPA Report to Congress on Flow Controls. For an EPA Report to Congress, Mr. Nevin managed an analysis of solid waste management markets, addressing market definition, market size, and recent market trends. He examined the competitive structure of the composting, recycling, waste-to-energy, and land disposal market segments, and evaluated each segment's potential for growth. This analysis was used to assess whether state and local government waste flow controls were needed to ensure adequate waste management capacity and/or to achieve state recycling goals.
- G** Economic Analysis of Lead Paint Hazard Evaluation and Reduction Rule. Mr. Nevin was the project manager and principal author of the Economic Analysis of the HUD rule on lead paint hazard evaluation and control in federally-assisted housing. To address complex regulatory requirements that varied by HUD program and by age of housing, Mr. Nevin developed a methodology that estimated costs and benefits per housing unit for specific types of hazard evaluation and reduction activities. The benefits attributable to hazard reduction activities in were based on an analysis of recent academic literature on the correlation between blood lead levels and specific lead paint hazards. Housing survey data were used to estimate occurrence frequencies for unit costs and benefits, and a spreadsheet model was developed to calculate total program costs and benefits by age of housing unit for each HUD program.
- G** Energy Star Finance. Mr. Nevin managed a variety of analytical tasks in support of the Energy Star Financing Program for new homes and HVAC equipment. Specific issues addressed have included analyses of mortgage insurance markets, credit scoring, and reverse mortgages; the development of a mortgage comparison spreadsheet model to facilitate financial analysis of ENERGY STAR upgrade options; and analysis of financial options and benefits associated with HVAC upgrade to ENERGY STAR efficiency. Mr. Nevin also performed a regression analysis of American Housing Survey data indicating that residential markets assign an incremental value to energy efficient homes that reflects the discounted value of annual fuel savings resulting from energy efficiency. This research was later peer reviewed and published in *The Appraisal Journal*.

- G** Financial Test for Environmental Obligations. Mr. Nevin managed an economic evaluation of financial test alternatives for RCRA financial assurance requirements. For this analysis, he developed a model that quantified public costs (environmental obligations not honored by bankrupt firms) and private costs (costs of third-party financial assurance for solvent firms unable to pass a financial test). He also managed the data collection and analysis to use this model to identify tests that minimize the sum of public and private costs.
- G** Partnership for Advancing Technology in Housing (PATH). Mr. Nevin managed a strategic analysis, program and organization evaluation, and related analyses for the PATH initiative (led by HUD). Issues addressed include analyses of energy efficiency, durability, and safety goals for new and existing housing, and the potential benefits of coordinated strategies for HUD lead hazard reduction efforts, EPA Energy Star Homes, and DOE weatherization assistance. Baseline data and measurement criteria for evaluating progress toward each PATH goal are also being developed to support and implement the strategic plan.
- G** Cumulative Implementation Cost of Drinking Water Regulations. Mr. Nevin managed an analysis of the cumulative regulatory costs associated with the Safe Drinking Water Act, compiling operating and capital costs by system size, for monitoring and treatment. Cost estimates were based on EPA cost and technology documents, interviews with treatment system vendors and EPA staff experts, a comparative analysis of cost estimates developed by the American Water Works Association (AWWA), and interviews with engineering cost experts to evaluate variations in EPA and AWWA estimates.
- G** Hazardous Waste Identification Rule (HWIR). Mr. Nevin managed the database modeling and net cost savings analysis for the EPA Regulatory Impact Analysis for the HWIR-Media rule. A large database on contaminated soil and sediment sites was compiled, and Mr. Nevin conducted a statistical analysis to devise a simple algorithm to estimate the percent of media at each site above any HWIR-media "bright line" triggering hazardous waste management requirements. A database model applied this algorithm to media volume and contaminant concentrations at each site to estimate the management costs under alternative scenarios.
- G** Impact of RCRA Scenarios on the Scrap Recycling Industry. For the Institute of Scrap Recycling Industries, Mr. Nevin developed a computer spreadsheet model to evaluate the impact on scrap metal recyclers resulting from regulatory scenarios classifying a portion of inbound scrap or outbound scrap byproducts as hazardous waste. This model reflected the amount of scrap recycled by region, associated waste byproducts, regional waste transport and disposal costs, and fixed and variable regulatory costs incurred if inbound scrap were characterized as hazardous. Effects measured included the change in scrap prices, metal recovery, and waste disposal volumes resulting from regulatory scenarios.
- G** Comparative Cost Analysis of Solid Waste Disposal Alternatives. Mr. Nevin developed a comparative cost analysis of waste management alternatives (i.e., composting, recycling, waste-to-energy facilities, and land disposal) for a DOE guide for local officials, including a range of input values and a report format that allowed local officials to interpolate values appropriate to local conditions.

## SELECTED PUBLICATIONS

### Peer-reviewed Publications

- How Lead Exposure Relates to Temporal Changes in IQ, Violent Crime, and Unwed Pregnancy*, by Rick Nevin, Environmental Research, May 2000
- Evidence of Rational Market Values for Home Energy Efficiency*, by Rick Nevin and Greg Watson, The Appraisal Journal, October 1998
- More Evidence of Rational Market Values for Home Energy Efficiency*, by Rick Nevin, Heather Gazan, and Christopher Bender, The Appraisal Journal, October 1999

### Other Publications and Client Reports

- Partnership for Advancing Technology in Housing (PATH) Strategy and Operating Plan*, prepared for Office of Policy Development and Research, U.S. Department of Housing and Urban Development, October 25, 2000.
- Eliminating Childhood Lead Poisoning: A Federal Strategy Targeting Lead Paint Hazards (Appendix)*, President's Task Force on Environmental Health Risks and Safety Risks to Children, February 2000
- Economic Assessment of the Final Rule on Lead-Based Paint*, Office of Lead Hazard Reduction, U.S. Department of Housing and Urban Development, September 7, 1999
- Draft Regulatory Impact Analysis of the Proposed Rule on Lead-Based Paint*, Office of Lead Hazard Reduction, U.S. Department of Housing and Urban Development, October 4, 1995
- Cost-Benefit Assessment of Proposed Hazardous Waste Identification Rule for Contaminated Media*, Office of Solid Waste, U.S. Environmental Protection Agency, September 1995
- EPA Report to Congress on Flow Controls (Solid Waste Management Market Analysis)*, Office of Solid Waste, U.S. Environmental Protection Agency, 1994
- Cumulative Implementation Cost of Drinking Water Regulations* Office of Ground Water and Drinking Water, U.S. Environmental Protection Agency, 1991
- Analysis of Regulatory Scenarios Affecting Metal Scrap Recycling Industries*, prepared for the Institute of Scrap Recycling Industries, June 1993.

### Employment History

ICF Incorporated	Vice President	1996-present
	Project Manager	1993-1996
	Senior Associate	1988-1993
Retirement Policy Institute	Senior Fellow	1990 LOA
Mellon Bank Corporation	Officer, Consulting Department	1984-1988
Packaging Corp. of America	Strategic Planning Analyst	1983
SIAR Incorporated	Management Consultant	1981-1982
Center for Strategy Research	Market Analyst	1980-1981