

**BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

|  |          |                             |
|--|----------|-----------------------------|
| <b>IN RE: APPLICATION OF TRANS-ALLEGHENY</b>   | <b>:</b> |                             |
| <b>INTERSTATE LINE COMPANY FOR</b>             | <b>:</b> |                             |
| <b>(I) A CERTIFICATE OF PUBLIC CONVENIENCE</b> | <b>:</b> |                             |
| <b>TO OFFER, RENDER, FURNISH AND/OR</b>        | <b>:</b> |                             |
| <b>SUPPLY TRANSMISSION SERVICE IN THE</b>      | <b>:</b> |                             |
| <b>COMMONWEALTH OF PENNSYLVANIA;</b>           | <b>:</b> |                             |
| <b>(II) AUTHORIZATION AND CERTIFICATION</b>    | <b>:</b> |                             |
| <b>TO LOCATE, CONSTRUCT, OPERATE AND</b>       | <b>:</b> | <b>Docket Nos. A-110172</b> |
| <b>MAINTAIN CERTAIN HIGH VOLTAGE ELECTRIC</b>  | <b>:</b> | <b>A-110172F0002</b>        |
| <b>TRANSMISSION LINES AND RELATED ELECTRIC</b> | <b>:</b> | <b>A-110172F0003</b>        |
| <b>SUBSTATION FACILITIES; (III) AUTHORITY</b>  | <b>:</b> | <b>A-110172F0004</b>        |
| <b>TO EXERCISE THE POWER OF EMINENT</b>        | <b>:</b> | <b>G-00071229</b>           |
| <b>DOMAIN FOR THE CONSTRUCTION AND</b>         | <b>:</b> |                             |
| <b>INSTALLATION OF AERIAL ELECTRIC</b>         | <b>:</b> |                             |
| <b>TRANSMISSION FACILITIES ALONG THE</b>       | <b>:</b> |                             |
| <b>PROPOSED TRANSMISSION LINE ROUTES</b>       | <b>:</b> |                             |
| <b>IN PENNSYLVANIA; (IV) APPROVAL OF AN</b>    | <b>:</b> |                             |
| <b>EXEMPTION FROM MUNICIPAL ZONING</b>         | <b>:</b> |                             |
| <b>REGULATION WITH RESPECT TO THE</b>          | <b>:</b> |                             |
| <b>CONSTRUCTION OF BUILDINGS; AND</b>          | <b>:</b> |                             |
| <b>(V) APPROVAL OF CERTAIN RELATED</b>         | <b>:</b> |                             |
| <b>AFFILIATED INTEREST ARRANGEMENTS</b>        | <b>:</b> |                             |

**REBUTTAL TESTIMONY OF FREDERICK H.  
RUETER, Ph.D.**

**Re: Economic Impacts of TrAIL on the Pennsylvania Economy**

**December 10, 2007**

REBUTTAL TESTIMONY OF FREDERICK H. RUETER, Ph.D.

1 Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

2 A. My name is Frederick H. Rueter and my business address is 121 North Highland  
3 Avenue, Pittsburgh, Pennsylvania 15206.

4

5 DUTIES AND RESPONSIBILITIES

6 Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

7 A. I am employed by CONSAD Research Corporation as a Vice President. In that  
8 capacity, I am primarily responsible for CONSAD's microeconomic and  
9 interindustry analysis, statistical and econometric analysis, simulation modeling,  
10 and policy design studies. On projects for which I have been principal  
11 investigator, I have typically supervised between two and ten other researchers,  
12 often including researchers from multiple scientific disciplines.

13

14 EDUCATION AND EXPERIENCE

15 Q. PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE AND  
16 EDUCATIONAL BACKGROUND.

17 A. I have a B.S., Industrial Management, from Carnegie Institute of Technology  
18 (1965), a M.S., Industrial Administration, from Carnegie Institute of Technology  
19 (1966) and a Ph.D., Economics, from Carnegie Mellon University ( 1973). My  
20 professional resume is attached to this testimony as TrAILCo Rebuttal Exhibit  
21 FHR-1.

1 Q. DO YOU HAVE ANY SPECIALTIES?

2 A. Yes. A substantial majority of the projects that I have supervised or participated  
3 in have involved evaluation of the likely consequences, effects, or impacts of  
4 prospective projects, programs, and policies. In addition to the Trans-Allegheny  
5 Interstate Line ("TrAIL"), large facility development projects for which I have  
6 been involved in estimating impacts have included expansion of an electricity  
7 generating station, development of a casino and race track, reutilization of a  
8 brownfield industrial site, navigation projects on inland waterways, and flood  
9 control projects. I have also directed or worked on assessing impacts from  
10 programs intended to stimulate innovation, technology transfer, research and  
11 development, conventional and alternative energy development, recycling, and  
12 waste reduction; and public policies and programs intended to improve health  
13 insurance and health care, occupational and public health and safety, terms and  
14 conditions of employment, job training, economic growth, environmental quality,  
15 criminal justice, and tax equity or fairness. Many of the projects have involved  
16 developing and applying new or improved evaluation measures and methods. My  
17 experience thus includes designing and refining evaluation procedures and  
18 practices, in addition to applying conventional approaches.

19

20 Q. HAVE YOU AUTHORED ANY PAPERS OR JOURNAL ARTICLES?

21 A. Yes. I have authored or co-authored technical reports on each project that I have  
22 supervised or been substantively involved, including all of the projects discussed  
23 above. I have also authored or co-authored articles that have been published in

1 professional journals, conference proceedings, monograph series, and regulatory  
2 dockets. Selected citations for published articles and technical reports are  
3 contained in my professional resume, which is attached to this testimony as  
4 TrAILCo Rebuttal Exhibit FHR-1.

5  
6 PURPOSE OF TESTIMONY

7 Q. PLEASE DESCRIBE THE PURPOSE OF YOUR TESTIMONY?

8 A. On behalf of Trans-Allegheny Interstate Line Company (“TrAILCo”), I will  
9 address the economic impacts on the Pennsylvania economy, including especially  
10 the impacts on the economy of Washington and Greene Counties that will be  
11 associated with the construction and operation of the Pennsylvania segments of  
12 TrAIL. This testimony specifically rebuts the testimony of numerous witnesses  
13 from the public input hearings who claimed that TrAIL will provide no or  
14 negligible economic benefits to Washington and Greene Counties in  
15 Pennsylvania.

16  
17 Q. WILL THE USE OF VARIOUS TERMS IN YOUR TESTIMONY BE  
18 CONSISTENT WITH THE DEFINITIONS ASSIGNED TO THOSE TERMS IN  
19 THE TABLE OF NOMENCLATURE ATTACHED TO TRAILCO WITNESS  
20 FLITMAN'S DIRECT TESTIMONY AS TRAILCO EXHIBIT DEF-1?

21 A. Yes. In addition, I may define other terms in my rebuttal testimony.

1 EXHIBITS

2 Q. PLEASE IDENTIFY AND DESCRIBE THE EXHIBITS TO YOUR  
3 REBUTTAL TESTIMONY AND SUMMARIZE THE CONTENTS OF THOSE  
4 EXHIBITS.

5 A. I am sponsoring two exhibits with my rebuttal testimony:

- 6 • TrAILCo Rebuttal Exhibit FHR-1 presents my professional resume..
- 7 • TrAILCo Rebuttal Exhibit FHR-2 presents the economic impacts associated with  
8 the construction and operation of the Pennsylvania Segments of TrAILCo on the  
9 Pennsylvania economy.

10

11 ECONOMIC IMPACT OF THE CONSTRUCTION AND  
12 OPERATION OF THE PENNSYLVANIA SEGMENTS OF TRAIL

13

14 Q. WHAT IS AN ECONOMIC IMPACT STUDY?

15 A. An economic impact study evaluates the economic consequences, effects, or  
16 impacts that are associated with a project such as the development and operation  
17 of a new business or the expansion, contraction, or closure of an existing business  
18 within a region. New or expanding businesses commonly have two distinct sets of  
19 economic impacts. The first set is associated with the construction of facilities  
20 used by the business, and the second is associated with the operation and  
21 maintenance of the facilities by the business.

1 Q. WHAT ARE THE ECONOMIC IMPACTS MEASURED BY AN ECONOMIC  
2 IMPACT STUDY?

3 A. An economic impact study measures three types of economic impact that sum to  
4 the total economic impact. They are the direct, indirect, and induced impacts.  
5 Purchases of labor, supplies, and materials by a business during either the  
6 construction or operation of facilities are the direct impact. Those purchases  
7 generate indirect impacts as the providers of those goods and services, in turn,  
8 procure labor, supplies, and materials from others. Similarly, the purchases of  
9 goods and services by the employees of the business produce induced impacts as  
10 the providers of those goods and services procure labor, supplies, and materials.  
11 The providers of goods and services to those businesses and individuals then  
12 procure labor, supplies, and materials, thereby generating additional indirect  
13 impacts; and the employees of those businesses purchase goods and services,  
14 thereby yielding additional induced impacts. As these cycles of purchases  
15 continue, more indirect and induced impacts are produced, but the incremental  
16 impacts become smaller with each successive cycle until they are negligible. The  
17 sum of the direct impacts and the cascade of monotonically diminishing indirect  
18 and induced impacts that result from this continued re-spending of funds is the  
19 total economic impact associated with the economic activity under consideration.

20

21 Q. HOW DO YOU ESTIMATE THE ECONOMIC IMPACTS?

22 A. In the economic impact study of the Pennsylvania segments of TrAIL, the  
23 economic impacts have been estimated using the RIMS II regional input-output

1 modeling system. RIMS II has been developed and is routinely updated and  
2 maintained by the Bureau of Economic Analysis in the U.S. Department of  
3 Commerce. The system is widely used by federal agencies, such as the  
4 Department of Defense, the Nuclear Regulatory Commission, and the U.S.  
5 Department of Housing and Urban Development, by state agencies including state  
6 transportation departments, by private-sector consulting organizations, and by  
7 academicians throughout the United States. The outputs from the modeling  
8 system are economic multipliers that estimate the total direct, indirect, and  
9 induced impacts that are produced per dollar of direct expenditure in specific  
10 industries. The modeling methodology has been extensively peer-reviewed, and  
11 the accuracy of the economic multipliers has been empirically evaluated.  
12 Empirical tests have found that multipliers calculated by RIMS II do not differ  
13 substantially from multipliers produced by regional input-output models that are  
14 based on economic surveys and, hence, are relatively expensive to compute. The  
15 RIMS II multipliers have not differed from comparable survey-based multipliers  
16 by more than five percent on average, or by more than ten percent for specific  
17 industries. The economic multipliers relating the accumulated indirect and  
18 induced economic impacts to the direct expenditures on a project are a clear  
19 indication of the magnitude of the economic linkage between the project and the  
20 regional economy under consideration.

1 Q. WHAT DATA DID YOU USE IN THE ESTIMATION OF THE ECONOMIC  
2 IMPACTS ASSOCIATED WITH THE CONSTRUCTION AND OPERATION  
3 OF THE PENNSYLVANIA SEGMENTS?

4 A. The data used to measure the projected direct expenditures on the Pennsylvania  
5 segments of TrAIL were provided by TrAILCo. The total estimated cost of the  
6 Pennsylvania Segments is \$240 million during the period from 2007 through the  
7 projected in-service date in 2011, with projected annual operation and  
8 maintenance costs of \$561 thousand per year thereafter. Estimates of the costs of  
9 specific categories of materials and labor were projected for the planned  
10 construction of the Pennsylvania segments during individual years. Projected  
11 annual operation and maintenance costs associated with the subsequent use of the  
12 completed Pennsylvania segments were also provided. All economic estimates  
13 discussed in my testimony are expressed in terms of dollars of constant value in  
14 2006.

15

16 Q. WHAT IS THE REGIONAL ECONOMY AND TIME FRAME EXAMINED IN  
17 YOUR IMPACT STUDY?

18 A. The Pennsylvania segments of TrAIL are projected to cross two Pennsylvania  
19 counties. Their precise locations will depend on the final corridor selected for  
20 TrAIL. For the purpose of the impact study, economic impacts have been  
21 estimated for the entire Pennsylvania economy, for the regional economy  
22 consisting of Greene and Washington Counties, and for the economy in the  
23 remainder of the state. The construction activity is projected to be performed

1 during the period from 2007 through 2011. The economic impacts estimated for  
2 each year are summed to project the total impacts throughout that period.

3

4 Q. WHAT ARE THE ECONOMIC IMPACTS?

5 A. The economic impacts throughout the Pennsylvania economy that are projected to  
6 be associated with the construction of the Pennsylvania segments of TrAIL are  
7 summarized in TrAILCo Rebuttal Exhibit FHR-2. In terms of business output,  
8 the total direct, indirect, and induced impact during the construction of TrAIL is  
9 \$815 million statewide, of which \$410 million will be generated in Washington  
10 and Greene Counties. In terms of employee compensation, the total direct,  
11 indirect, and induced impact during construction is \$190 million statewide, of  
12 which \$99 million will be earned by households in Washington and Greene  
13 Counties. In terms of employment, the total direct, indirect, and induced impact  
14 during construction is 4,984 person-years statewide, of which 2,515 person-years  
15 will be furnished by workers in Washington and Greene Counties. A person-year  
16 of labor is equivalent to one person working full-time throughout a year. It may  
17 actually consist of several people who have part-time jobs and collectively work  
18 the total number of hours worked annually by a typical full-time employee.

19

20 During the operation of TrAIL, the total annual impact on business output will be  
21 \$1.90 million statewide, including \$828,000 in Washington and Greene Counties.

22 In terms of employee compensation, the total annual impact will be \$442,000  
23 statewide, including \$127,000 in the two counties. Finally, in terms of

1 employment, the total annual impact will be 12 person-years statewide, including  
2 two person-years in the two counties. These impacts will accrue during each year  
3 that TrAIL is in service, and will accumulate over that period.

4

5 Q. DOES THE CONSTRUCTION AND OPERATION OF THE PENNSYLVANIA  
6 SEGMENTS OF TRAIL HAVE ANY IMPACTS ON STATE AND LOCAL  
7 TAX REVENUES?

8 A. Yes. The results of our research indicate that \$39 million in additional state tax  
9 revenues will be generated from the construction of TrAIL in Pennsylvania over  
10 the period 2007-2011. The estimated revenue includes yields from the consumer  
11 sales and use tax, personal income tax, corporate net income tax, and  
12 unemployment compensation tax. During the operation of TrAIL, the additional  
13 state tax revenues will be \$3.1 million annually. While there are also possible  
14 revenues associated with licenses, fees, and motor fuel taxes, data required to  
15 estimate revenues from these sources are not available. Thus, these estimates are  
16 conservative. For local governments within Washington and Greene Counties,  
17 the estimated additional tax revenue totals \$20.1 million during construction and  
18 \$6.0 million annually during operation throughout the useful life of TrAIL. The  
19 estimated revenue will be obtained from the earned income tax, the emergency  
20 and municipal services tax, and county, municipal, and school district real estate  
21 property taxes. For other local governments throughout the state, the estimated  
22 additional tax revenue totals \$1.6 million during construction and \$5.400 annually  
23 during operation. The sources of this estimated revenue are the earned income tax

1 and the emergency and medical services tax. Finally, the federal government will  
2 receive estimated additional tax revenue totaling \$58.0 million during  
3 construction and \$10.7 million annually during operation. The sources of this  
4 estimated revenue are the corporate income tax, social security tax, and federal  
5 unemployment tax. Thus, in total, the estimated additional tax revenue to all  
6 levels of government that will be generated by TrAIL will be \$119 million during  
7 construction and \$20 million annually during operation.

8  
9 Q. ARE THERE OTHER ECONOMIC IMPACTS ASSOCIATED WITH THE  
10 CONSTRUCTION AND OPERATION OF THE TRANSMISSION LINE?

11 A. Yes. There are other economic impacts associated with the line besides those  
12 addressed in my rebuttal testimony. The infusion of additional funds into the  
13 Pennsylvania economy represents additional deposits in Pennsylvania financial  
14 institutions to increase their loans to both business and consumers, thereby  
15 creating more economic activity. The enhanced transmission capacity increases  
16 the reliability of the current transmission grid in the state, possibly leading to  
17 fewer electrical outages in the future as well as increasing opportunities for new  
18 businesses to locate in Pennsylvania based on the improved reliability.

19  
20 Q. PLEASE SUMMARIZE THE RESULTS OF YOUR ANALYSES.

21 A. In marked contrast to the assertions of the witnesses at the public input hearings  
22 who asserted that developing and operating TrAIL will provide no or negligible  
23 economic benefits to Washington and Greene Counties in Pennsylvania, the

1 results of our economic impact analysis demonstrate that the beneficial economic  
2 impacts that TrAIL will provide will be substantial both in those two counties and  
3 throughout the state. In particular, the construction of TrAIL will generate large  
4 increases in business output, household earnings, and employment statewide.  
5 Slightly more than half of those increases will be realized in Washington and  
6 Greene Counties.

7  
8 Additional gains in business output, employee income, and employment will be  
9 generated by the operation and maintenance of TrAIL. Although the annual gains  
10 will be smaller than those produced each year during construction, they will  
11 accrue in every year when TrAIL is in service.

12  
13 Finally, the development and operation of TrAIL will yield substantial increases  
14 in tax revenues for the federal government, the state government, and local  
15 governments throughout Pennsylvania, including especially school districts and  
16 municipal governments within Washington and Greene Counties.

17

18 Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

19 A. Yes. However, I reserve the right to file such additional testimony as may be  
20 necessary or appropriate.

**FREDERICK H. RUETER**

**Vice President**

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## **SUMMARY**

Dr. Rueter is a Vice President of CONSAD and is primarily responsible for CONSAD's microeconomic and interindustry analysis, statistical and econometric analysis, simulation modeling, and policy design studies. He also is an Adjunct Professor of Economics at Carnegie Mellon University continuously since 1988, where he has taught courses in the economics of natural resources, the economics of the environment, and benefit-cost analysis. Since joining CONSAD in 1973, Dr. Rueter has been involved, substantively and administratively, in a wide variety of research efforts.

## **EDUCATION**

Ph.D., Economics, Carnegie Mellon University, 1973

M.S., Industrial Administration, Carnegie Institute of Technology, 1966

B.S., Industrial Management, Carnegie Institute of Technology, 1965

## **SELECTED PROJECT EXPERIENCE**

**Regional Economic Impact Analysis of Electric Transmission Line** – Dr. Rueter was principal investigator of CONSAD's project to estimate the economic impacts of the construction and operation of the Trans-Allegheny Interstate Line on industrial output, employment, household earnings, and tax revenues in Southwestern Pennsylvania and throughout the state.

**Socioeconomic Impact Analysis of Power Plant Expansion** - Under subcontract to Energy Impact Associates, Dr. Rueter evaluated and provided expert testimony on the probable socioeconomic consequences of the proposed expansion of a coal-fired generating station by an electric utility in the Southwestern U.S.

**Regional Impact Analysis of Race Track and Casino** – For Presque Isle Downs, Inc, Dr. Rueter directed CONSAD's project to estimate the impacts of the construction and operation of a thoroughbred race track and slots casino on industrial output, employment, and household earnings in Northwestern Pennsylvania, on municipal and state tax revenues, and on municipal services and infrastructure.

**Analysis of Regional Economic Impacts of the Health Care Sector** - Dr. Rueter was a principal researcher on studies, for the Heinz Family Foundation, evaluating the impacts of the health care sector on the regional economies in Southwestern Pennsylvania and Massachusetts. A primary focus of the studies was analysis of the consequences of public and private initiatives to contain health care costs on: regional employment; biomedical research, especially in academic medical centers; medical innovation; and emergent biotechnology ventures.

**Impact Assessment of Technological Alternatives for Electricity Generation in the Northwest** - Under subcontract to the RAND Corporation, Dr. Rueter participated in CONSAD's estimation of the economic impacts of using alternative combinations of fossil fuel, hydroelectric, and other renewable technologies for generating electric power in the Northwest.

**Economic Impact Assessment for Advanced Technology Program** - For the National Institute of Standards and Technology (NIST), Dr. Rueter participated in an evaluation of the economic justification for and impacts of a research program to control dimensional variation during the assembly of automobile bodies, which was performed by a joint venture of automobile manufacturers, assembly line producers, and universities with funding from NIST's Advanced Technology Program.

**Impact Assessment of Demanufacturing of Electronic Equipment for Reuse and Recycling (DEER2) Program** - Dr. Rueter directed CONSAD's study for CTC on the effects that use of DEER2 technologies can realistically be expected to have on economic activity, employment, and hazardous and non-hazardous waste disposal.

**Impact Evaluation for Industrial Waste Reduction Program** - For DOE, under subcontract to New Mexico State University, Dr. Rueter served as principal investigator on CONSAD's assessment of the improvements in aggregate economic activity, employment, energy consumption, and waste generation that might be stimulated by government cost-sharing on research, development, and dissemination of technologies for industrial waste reduction.

**Economic Impact Assessment of the Electronic Commerce Resource Center (ECRC) Program** - Dr. Rueter participated in CONSAD's study for CTC evaluating the long-term economic consequences from the increased use of electronic commerce in conducting business transactions that realistically might be stimulated by the ECRC Program.

**Impact Evaluation for National Defense Center for Environmental Excellence** - Dr. Rueter participated in the development and initial application of a methodology that combines life-cycle analysis, input-output modeling, econometric forecasting, and systematic elicitation of expert judgments to produce estimates of the likely economic, employment, energy conservation, and environmental impacts from demonstrating and transitioning environmentally sensitive technologies to private industry.

**Gulf Intracoastal Waterway Impact Assessment Design** - Dr. Rueter was principal investigator of CONSAD's project, for the New Orleans District of the U.S. Army Corps of Engineers (COE), to design methods for evaluating the national and regional economic, social, institutional, and political impacts of structural projects and nonstructural policies applied to the Gulf Intracoastal Waterway.

**Impact Assessment Methodology for Mineral Supply Disruptions** - For DOI, Dr. Rueter participated in the development and implementation of a methodology to estimate the

macroeconomic and national security impacts of disruptions in the supply of critical minerals, and to assess the effectiveness of various policy options in mitigating such impacts.

**Economic Incentives for Geothermal Development** - Dr. Rueter participated in a study for the DOE to identify potentially effective economic incentives to promote the emergence of a viable geothermal industry.

**Technical Review of Prospective Coal Leasing Policy** - For the Commission on Fair Market Value Policy for Federal Coal Leasing, Dr. Rueter participated in CONSAD's technical review of the Commission's draft final report, focusing on the implications of uncertainty for alternative forms of Federal coal leasing policy, ranging from current lease valuation methods based on competitive bonus bidding to contingent procedures that capitalize on emerging information.

**Analysis of Incremental Value of Improved Mineral Resources Information** - Dr. Rueter was the principal investigator for CONSAD's project for the Department of the Interior (DOI) to examine, within a statistical decision theory framework, the incremental value of acquiring improved mineral resources information for use in comparing mineral values to the values of other competing land uses in multiple-use Federal land planning and management.

**Economic Incentives for Land Use Control** - Dr. Rueter was primarily responsible for CONSAD's analysis of the economic incentives embodied in a variety of traditional and innovative land use control instruments for the EPA.

**Benefit-Cost Analysis Methodology for Mined and Movable Land** - Dr. Rueter was primarily responsible for the development and demonstration, for the Appalachian Regional Commission, of a methodology for benefit-cost analysis of land use alternatives for mined and movable land in Appalachia.

**Simulation Model of National Liver Allocation Policy** - For the University of Pittsburgh Medical Center, Dr. Rueter participated in CONSAD's design, implementation, and application of a Monte Carlo simulation model of the allotment of donated livers among patients at different transplant centers under alternative allocation policies.

**Simulation Model of Response to Bioterrorist Attack** - Under subcontract to and in collaboration with the University of Pittsburgh, Dr. Rueter participated in the design of a conjoined epidemiology and economic resource allocation model for responding to a bioterrorist attack, and the initial application of the model to a conjectured Anthrax attack, for the Agency for Healthcare Research and Quality (AHRQ).

**Development of Workbook for Sharing Regional Bioterrorism Preparedness Tools** - Under subcontract to Research Triangle Institute and in collaboration with the University of Pittsburgh, Dr. Rueter directed CONSAD's development of tools for evaluating the use of critical medical

resources within a workbook of tools for preparing for bioterrorist events, produced for AHRQ and intended for use by agencies in other regions.

**Medical Reimbursement of Long-Term Care for the Elderly in Pennsylvania** - Dr. Rueter participated in a study for the Jewish Health Care Foundation that analyzed and evaluated the likely consequences of potential changes in Medicaid reimbursement policies on the types and amounts of long-term care provided to senior citizens in Pennsylvania, including care in home and community-based settings, in assisted living facilities and personal care homes, and in traditional nursing homes.

**Employment and Related Economic Effects of Health Care Reform** - Dr. Rueter participated in CONSAD's study to perform a comprehensive analysis and realistic estimation of the likely impacts of prominent national health care reform proposals on employment and the economy. Impacts examined include jobs lost and affected, wages lost, and implicit government subsidies of mandated business payments for employees' health insurance.

**Employment Impacts of Health Care Reform Proposals** - Dr. Rueter served as project director of CONSAD's study, for the Department of Health and Human Services, to evaluate the potential employment impacts associated with several proposals for improving the provision of health care through managed competition.

**Employment Impacts of Mandatory Health Insurance** - Dr. Rueter participated in a study for The Partnership on Health Care and Employment to investigate the employment impacts of health care reform proposals mandating employers' provision of health insurance for their employees.

**Critical Review of Analysis of Proposed Health Insurance Legislation** - Dr. Rueter was the primary performer of a critical technical review, for the National Federation of Independent Business (NFIB), evaluating the methodology, data, and results of an analysis by the Congressional Budget Office that estimated the expected impacts of Association Health Plans and HealthMarts on the provision of health insurance coverage to employees of small firms.

**Economic Impact Analysis of Any Willing Provider (AWP) Legislation for Pharmacies** - For American Drug Stores, Inc., Dr. Rueter conducted a study of the impacts of the AWP law for pharmacies in Massachusetts on drug prices, the total cost of providing prescription drugs to managed care providers, and the total cost of prescription drug benefits to consumers and employers.

**Economic Impacts of Rhode Island's Proposed Pharmacy Freedom-of-Choice Legislation** - For the Walgreen Company, Dr. Rueter prepared and presented expert testimony on the likely impacts the proposed legislation on prescription drug prices, the costs of administering pharmacy networks, the effects of innovations in information processing on those costs, the amounts of rebates paid by pharmaceutical manufacturers, and the provision of pharmacy benefits by Medicare health maintenance organizations (HMOs) in Rhode Island.

**Study of Biological and Chemical Factors in Hospital Admissions** - In collaboration with Consultants in Epidemiology and Occupational Health, Inc., Dr. Rueter performed the statistical analysis in an epidemiological study for Geneva Steel Company which demonstrates that the major determinant of pediatric respiratory hospitalizations in the two most populous counties in Utah has been viral factors rather than chemical air pollutants.

**Community Health Effects Evaluation** - For the Environmental Affairs Division of USX Corporation, Dr. Rueter was the principal investigator of CONSAD's study to evaluate the community health effects associated with general population exposure to coke oven emissions.

**Critical Review of Statistical Health Effects Studies** - For the American Iron and Steel Institute (AISI), Dr. Rueter conducted a critical review of several statistical analyses of the relationship between human mortality and daily exposures to particulate matter and sulfur dioxide.

**Critical Review of Study of Cancer Risks from Air Pollution** - For AISI, Dr. Rueter performed a critical review of a statistical study of the estimated cancer risks associated with general population exposure to ambient air contaminants in Southeast Chicago.

**Critical Review of Summary Report on Health Effects of Air Pollution** - Dr. Rueter prepared critical commentary for the Business Roundtable on a report published by the American Lung Association summarizing estimates from several other studies on the aggregate public health effects statistically associated with outdoor air pollution.

**Critical Review of EPA=s Risk Assessment Methods** - Dr. Rueter prepared and submitted to the National Research Council's Committee on Risk Assessment of Hazardous Air Pollutants critical comments on the risk assessment methods used by the U.S. Environmental Protection Agency (EPA) and on the EPA=s application of those methods to coke oven emissions.

**Review of Risk Assessment and Risk Management Knowledge and Practices** – For the Office of the Assistant Secretary for Policy in the Department of Labor, Dr. Rueter is principal investigator of CONSAD's project to review the current knowledge and best practices of selected federal agencies in risk assessment and risk management, and to recommend improvements in relation to occupational health and safety.

**Risk Communication in Industrial Health Risk Assessment Program** - Under subcontract to the Concurrent Technologies Corporation (CTC), Dr. Rueter was primarily responsible for developing methods for characterizing and communicating the occupational health risks associated with alternative production processes that companies might adopt to perform specific industrial functions.

**Risk Communication on High-level Nuclear Waste Repository** - Dr. Rueter was principal investigator of CONSAD's project to develop guidance for the Department of Energy (DOE) on the development and communication of effective messages to the general public in response to issues raised about risks associated with a national high-level nuclear waste repository.

**Assessment Methodology for Unintended Employment and Health Effects of Regulation** - Under subcontract to Sobotka and Company, Dr. Rueter was principal investigator of a study for the EPA to develop a methodology for estimating the unintended health effects of regulation, where he was primarily responsible for deriving procedures for evaluating the direct effects of regulation on employment in regulated firms.

**Adverse Economic, Employment, and Health Impacts of Air Quality Regulation** - In studies for AISI and The Business Roundtable, Dr. Rueter participated in the design and implementation of methods for examining the adverse economic, employment, and health impacts resulting from more stringent air pollution regulations for particulate matter, benzene, and ozone.

**Economic and Employment Impacts of Revised National Ambient Air Quality Standards (NAAQS) for Fine Particulate Matter** - Dr. Rueter directed this study for the Air Quality Standards Committee of the National Association of Manufacturers, which estimated the impacts of the proposed revision of the NAAQS for fine particulate matter on employment and the economy for the nation and, especially, for areas that were projected to be unable to attain compliance with the standard.

**Economic Impacts of Alternative Regulatory Proposals** - Dr. Rueter directed this study for the National Energy Technology Laboratory of the DOE, which estimated the comparative impacts that either controlling emissions from regional fossil-fuel-fired power plants or controlling local sources of emissions would have on employment and the economy for the nation and, especially, for areas that were projected to be unable to attain compliance with the NAAQS for fine particulate matter.

**Cost-Effective Attainment of Air Quality Standards** – For the Energy Information Administration of the DOE, in collaboration with Booz Allen Hamilton Inc., Dr. Rueter designed and directed the pilot implementation of a linear programming model that determines the allocation of control responsibility among emission sources that, taking into account both the local and the interregional effects of the emissions on ambient concentrations, achieves concurrent compliance with one or more NAAQSs in multiple non-attainment areas at minimum total abatement cost.

**Economic and Employment Impacts of Clean Air Act Amendments** - Dr. Rueter assisted in a study for The Business Roundtable and the Clean Air Working Group to estimate the economic and employment impacts associated with the Clean Air Act Amendments of 1990.

**Critical Review of EPA's Regulatory Impact Analysis on Particulate Matter** - For DOE, Dr. Rueter served as project director on CONSAD's technical examination of four issues relating to the EPA's regulatory impact analysis on its proposed standards for ambient particulate matter. The issues include EPA's estimation of nationwide control costs, control costs for U.S. electric utilities, health effects thresholds, and costs of non-health effects.

**Technical Review of Regulatory Benefits Analysis** - For AISI, Dr. Rueter was co-principal investigator of CONSAD's technical review of reports on the benefits analysis of alternative NAAQS for particulate matter prepared for EPA by Mathtech, Inc.

**Technical Review of Regulatory Impact and Cost Analysis System** - Dr. Rueter conducted, for AISI, a technical review of the analysis system developed for EPA by Energy and Environmental Associates and Argonne National Laboratory to estimate the air quality impacts and direct industrial costs of alternative NAAQS for particulate matter.

**Realistic Appraisal of Regulatory Costs and Benefits** - Dr. Rueter assisted in CONSAD's appraisal, for AISI, of the costs and benefits realistically associable with alternative national ambient air quality standards for particulate matter.

**Benefit-Cost Methodology for Pesticide Regulation** - For the EPA, Dr. Rueter was involved in the development of a benefit-cost methodology for the registration of chemical pesticides.

**Study of Benefit-Cost Techniques for Hazardous Waste Management** - Dr. Rueter participated in CONSAD's study, for the EPA, of benefit-cost techniques applicable to the control of hazardous materials, toxic substances, and solid wastes.

**Pollution Control Benefit-Cost Analysis Seminar** - For the EPA, Dr. Rueter was primarily responsible for conducting a two-day seminar and preparing supporting documentation on the usefulness, use, and practical limitations of benefit-cost analysis in pollution control decision-making.

**Critical Review of EPA's Regulatory Impact Analysis on Enhanced Monitoring** - Dr. Rueter was principal investigator of CONSAD's technical review, for the Ad Hoc EMON RIA Review Coalition, examining the data, methodology, and results from EPA's regulatory impact analysis of its proposed Enhanced Monitoring Program.

**Short-Term and Transitional Economic and Employment Impacts of a Carbon Tax** - For the Global Climate Coalition, Dr. Rueter was co-principal investigator of CONSAD's study to assess the short-term and transitional impacts on employment and the economy from a carbon tax intended to discourage emission of carbon dioxide and mitigate the putative risk of global warming.

**Assessment of Carbon Tax Impacts on Domestic Steel Industry** - Dr. Rueter served as co-principal investigator of a study for AISI to evaluate the impacts of a carbon tax on employment and economic conditions in the domestic steel industry.

**Sectoral and Regional Economic Impact Analysis of Global Climate Policy Options** - Dr. Rueter participated in this study for the National Coal Association to estimate the effects that proposed policies for reducing emissions of carbon dioxide are likely to have on employment and economic activity in specific industry sectors and geographic regions throughout the United States.

**Analysis of Impacts of Global Climate Policy on the Aluminum Industry** - Dr. Rueter directed this exploratory study of the potential beneficial and adverse economic impacts on Alcoa and the aluminum industry from the proposed Kyoto Protocol for reducing emissions of carbon dioxide and other greenhouse gases.

**Development of Regulatory Impact Model** - Dr. Rueter participated in CONSAD's development of a computer-based model for systematically evaluating the national and regional economic impacts of different forms of government regulations that affect private businesses, for NFIB.

**Cost-Effectiveness Analysis of Air Toxics Emissions Trading** - Under subcontract to Jack Fawcett Associates, Dr. Rueter was the project director on CONSAD's study for the EPA examining the feasibility and cost-effectiveness of allowing emissions trading of hazardous air pollutants released from integrated steelmaking facilities.

**Evaluation of the Air Quality Program in Pennsylvania** - Dr. Rueter was the principal investigator on this project for the Pennsylvania Department of Environmental Protection to evaluate the effectiveness of the state's Air Quality Program in implementing the requirements of the federal Clean Air Act and other air quality control initiatives, taking into account pertinent budgetary, statutory, procedural, and practical limitations.

**Analysis of Impacts of Air Quality Regulation on Domestic Producers in Internationally Competitive Industries** - Dr. Rueter directed CONSAD's study for the Stand Up for Steel Working Group, a joint labor-industry consortium, investigating the impacts of international differences in air quality regulation on economic conditions in the iron and steel, electronics, rubber, and lead-acid battery industries in seven nations and one multinational region.

**Technical Support for Regulatory Negotiations** - For AISI and the American Coke and Coal Chemical Institute (ACCCI), Dr. Rueter participated on the Cost and Economic Analysis Committee associated with the regulatory negotiations on practicable standards for coke oven emissions.

**Impact Assessment of Airborne Contaminant Standard** - Dr. Rueter served as project director on CONSAD's studies for the Occupational Safety and Health Administration (OSHA) to assess technological feasibility, health effects, and economic impacts of promulgating revised permissible exposure limits (PELs) for over 450 chemical substances in general industry.

**Impact Assessment of Methylene Chloride Standard** - Dr. Rueter served as project director on CONSAD's project to evaluate the effects of prospective revised OSHA standards for occupational exposure to methylene chloride,

**Impact Assessment of Asbestos Dust Standard** - Dr. Rueter served as project director on CONSAD's assessment of the impacts of prospective revised OSHA standards for occupational

exposure to asbestos dust in the construction, renovation, and demolition of buildings, and throughout industry in general.

**Impact Assessment of Shipbuilding Safety Standard** - Dr. Rueter was a task manager on CONSAD's project to assess OSHA's proposed vertical safety standard for the shipbuilding and repair industry.

**Cost-Effectiveness Methodology for Railroad Safety Standards** - Dr. Rueter participated in the formulation of a cost-effectiveness methodology for the evaluation of railroad safety standards for the Federal Railroad Administration.

**Inflationary Impact Analysis of Asbestos Dust Standard** - Dr. Rueter participated in CONSAD's development of an inflationary impact statement for OSHA's proposed revised standards for occupational exposure to asbestos dust, with primary responsibility for assessing the favorable health effects likely to be associated with the promulgation of more restrictive standards.

**Analysis of Impacts of Fair Labor Standards Act (FLSA) Exemptions** - Dr. Rueter was principal investigator for CONSAD's project to assist the Employment Standards Administration of the Department of Labor in evaluating the economic impacts of proposed revisions to regulations exempting specific salaried executive, administrative, and professional employees from the overtime provisions of the FLSA.

**Analysis of Impacts of Revisions to Family and Medical Leave Act (FMLA) Regulations** - Dr. Rueter was principal investigator for CONSAD's project to assist the Employment Standards Administration of the Department of Labor in evaluating the economic impacts of proposed revisions to the regulations implementing the FMLA.

**Estimation of Potential Caregivers for Wounded Military Service Members** – Dr. Rueter was principal investigator of CONSAD's project for the Employment Standards Administration in the Department of Labor to develop a model for estimating the numbers of family members who would become eligible caregivers for wounded military service members under alternative leave policies.

**Evaluation of Compliance Tools for Reducing Recidivism** – Under subcontract to SRA International, Inc., Dr. Rueter is directing CONSAD's project for the Office of the Assistant Secretary for Administration and Management (OASAM) of the Department of Labor to evaluate the effectiveness of Wage and Hour Division (WHD) compliance tools and performance goals in increasing compliance with DOL employment standards among previously investigated employers.

**Analysis of Occupational Safety and Health Regulations and Worker's Compensation Systems** - Dr. Rueter was the principal investigator for CONSAD's project to evaluate the impacts and interrelationships between OSHA regulations and Worker's Compensation systems, with specific attention to health and safety impacts.

**Assessment Methodology for Work-Related Consequences of Workers' Substance Use** - Dr. Rueter served as project director on CONSAD's study for OSHA and the National Institute on Drug Abuse (NIDA) to design a workable, scientifically valid procedure for evaluating the work-related consequences of workers' use of chemical substances that might impair job performance.

**Pilot Study of Prevalence and Impacts of Workers' Substance Use** - Dr. Rueter was the project director on CONSAD's pilot study for OSHA to evaluate the prevalence and safety consequences of drug and alcohol use by workers in industry.

**Socioeconomic Impact Assessment of Centers of Excellence** - For the DOE's Office of Civilian Radioactive Waste Management, Dr. Rueter managed CONSAD's project to assess the potential socioeconomic consequences of the design, development, and promotion of transferable technologies through site-specific Centers of Excellence.

**Cost and Capacity Evaluation for Training Impact Decision System** - Dr. Rueter served as principal investigator of CONSAD's project, in collaboration with McDonnell Douglas Training Systems and Metrica, Inc., to design, develop, and facilitate the implementation of a practical methodology for estimating training resource costs and capacities for use in a computer-based Training Impact Decision System (TIDES) developed for the U.S. Air Force.

**Analysis of On-the-job Training Capacity** - Dr. Rueter participated in CONSAD's project to develop and pilot test a workable methodology to estimate the capacity of Air Force operational units to conduct on-the-job training.

**Simulation Model of Air Force Manpower and Personnel System** - Dr. Rueter participated in the operational development, scenario testing, evaluation, augmentation, and improvement of the Integrated Simulation Evaluation Model Prototype (ISEM-P) of the Air Force Manpower and Personnel System, and has supervised the sensitivity analysis of ISEM-P for the Air Force Human Resources Laboratory.

**National Skills Market Model Design** - For the U.S. Air Force, Dr. Rueter directed CONSAD's study to design a methodology to forecast the impact of national labor market conditions on the private sector demand for, and the supply of, current and prospective Air Force enlisted personnel.

**Computer-Assisted Telephone Interviewing** - Dr. Rueter participated in the development and evaluation of a distributed on-line interviewing system prototype for performing telephone surveys of Air Force personnel.

**Flood Control Project Cost-Sharing Methodology** - Dr. Rueter was principal investigator of CONSAD's project for the Louisville COE District to develop a workable methodology and implementation guidebook for determining feasible arrangements for sharing the costs of COE flood control projects with non-federal sponsors.

**Cost-Effectiveness Analysis Methodology for Non-Structural Pollution Controls** - Dr. Rueter directed CONSAD's development of a practical methodology for evaluating the cost-effectiveness of non-structural pollution controls for the EPA.

**Technical Review of Comments on Postal Rate Proposal** - For the U.S. Postal Service, Dr. Rueter performed a critical review of comments submitted to the Postal Rate Commission in response to the rate increase proposed in 1980. The review involved applying traditional and emerging microeconomic concepts relating to natural monopoly, cost subadditivity, economies of scale and scope, and economically efficient and equitable pricing by single-product and multi-product monopolies.

**Growth Management Policy Evaluation Tools** - Dr. Rueter participated in CONSAD's project to develop analytic tools for the evaluation of various growth management and land use control policies for Fairfax County, Virginia.

**Options for Mitigating Municipal Fiscal Distress** – For the Appalachian Regional Commission, Dr. Rueter directed CONSAD's project to investigate courses of action available to communities that, due to financial insolvency, have lost their capacity to deliver municipal services, and to develop a general approach for formulating effective strategies for alleviating such fiscal distress.

**Evaluation of Property Assessment Procedures and Accuracy** - For the Allegheny County Office of Property Assessment, Dr. Rueter served as co-director of CONSAD's evaluation of the comparative performance of the property assessment process in three successive years, with primary responsibility for comparative analysis of assessment accuracy and uniformity.

**Analysis of Impacts of Alternative Property Tax Rate Structures** – For the Bermuda Ministry of Finance, Dr. Rueter directed an analysis of the impacts that alternative revisions to Bermuda's progressive tax rate structure would have on the total tax bills for recently reassessed residential properties in specific ranges of prior assessed values.

**Cost-Effectiveness Analysis of Junk Vehicle Abatement Programs** - Dr. Rueter developed and implemented a cost-effectiveness analysis of junk vehicle abatement programs for the Motor Vehicle Manufacturers Association.

**Evaluation of Options for Criminal Identification and Arraignment** - Dr. Rueter was principal investigator of this study for Allegheny County and the Pennsylvania Commission on Crime and Delinquency (PCCD) to evaluate the current process and alternative configurations for identifying criminal histories and conducting arraignments of suspects arrested by police agencies in the county.

**Feasibility Analysis of Industrial Complex Reutilization** - Dr. Rueter served as project director on CONSAD's project to determine the acquisition, development and financial feasibility of implementing new uses of land within the Midland, Pennsylvania steel plant complex.

**Examination of Key Issues in Providing Services to the Elderly** - Dr. Rueter directed CONSAD's study, for The Pittsburgh Foundation and the Allegheny County Area Agency on Aging, to forecast the eligible population, examine funding opportunities, analyze state funding procedures, and evaluate training and employment services for elderly and handicapped residents of the county.

**Analysis of Shocks that Jeopardize Retirement Security for Married Women** – For the Women's Institute for a secure Retirement (WISER), Dr. Rueter directed CONSAD's analysis of data collected in the Health and Retirement Study (HRS) to investigate the types of shocks to their health, employment, or marital status that adversely affect the financial security of married women who are retired or nearing retirement.

**Assessment of Technical Assistance to Development Programs** - Dr. Rueter participated in CONSAD's study to assess the effectiveness, efficiency, and impacts of the efforts undertaken by the Department of Housing and Urban Development to provide technical assistance to recipients of Community Development Block Grants and Urban Development Action Grants.

**National Economic Model of Bermuda** - For the Bermuda Ministry of Finance, Dr. Rueter directed the development, estimation, and initial implementation of a macroeconomic, inter-industry model for use in forecasting economic activity and assessing likely impacts of prospective policy initiatives in Bermuda.

**Development of Long-Range Economic Forecast for Bermuda** – For the Bermuda Ministry of Finance, Dr. Rueter is directing the development and implementation of a methodology for projecting long-range economic activity in individual industries and occupations for use in planning for sustainable economic and labor force development in Bermuda.

**Puerto Rico Regional Economic Model** - Dr. Rueter co-directed the formulation and estimation for the Economic Development Administration of a regional econometric model of Puerto Rico, focusing on the impact of various public policies on the spatial pattern of economic growth and development on the island.

**Analysis of Cash-Flow Implications of Business Tax Provisions** - For DOE, Dr. Rueter directed an analysis of the implications of the business tax provisions of the Economic Recovery Tax Act of 1981 for cash flow in a sample of firms in selected energy industries, and for the aggregate economy.

**Assessment of Effectiveness of Business Tax Incentive Options** - For the National Science Foundation (NSF), Dr. Rueter served as principal investigator on CONSAD's project to perform a preliminary assessment of the effectiveness of tax incentive options as mechanisms for stimulating business contributions for university research and research training.

**Impact Assessment of the Federal Estate Tax** - Dr. Rueter directed CONSAD's study of the aggregate impacts of the federal estate tax on national and regional economic activity, for the Food Marketing Institute.

**Analysis of Effects of Repealing the Federal Estate Tax on Government Revenues** - Dr. Rueter directed CONSAD's study of the net changes in federal government revenues that would result from repealing the federal estate tax and thereby exposing estate assets to other federal taxes, for the American Family Business Institute.

**Analysis of Long-Term Effects of Repealing the Federal Estate Tax on Economic Activity and Government Revenues** – Dr. Rueter directed CONSAD's study of the incremental economic growth and consequent government revenues that would be generated from the additional accumulation of capital that would accrue from reducing the diversion of resources from their most productive uses by people preparing for their potential estate tax liability, for the American Family Business Institute.

**Analysis of Impacts of Tax on Poured Alcoholic Beverages** – Dr. Rueter directed CONSAD's project for a consortium of restaurateurs to estimate the impacts of a proposed tax on poured alcoholic beverages on the sales, revenues, and profits of restaurants, bars, and event venues in Allegheny County, Pennsylvania.

**Examination of "New Economics" Concepts** - Dr. Rueter was principal investigator of a study for DOE examining the implications for economic forecasting and policy analysis of the "New Economics" concepts concerning monetarism, rational expectations, and supply-side phenomena.

**Validation Strategies for Financial Reporting System** - Dr. Rueter participated in the development of alternative strategies for validating the reliability and significance of DOE's Financial Reporting System.

**Study of Programmatic Use of Venture Analysis Reports** - For DOE, Dr. Rueter conducted a study examining the use of venture analysis reports in program formulation and budget justification.

**Study of Budget Economics** - For the Bureau of Mines (BOM), Dr. Rueter directed a project to interpret economic resource allocation concepts in terms which can readily be used in BOM's budget analysis process.

**Evaluation of Incentive Mechanisms for Regulatory Compliance** - Under subcontract to TRW, Inc., Dr. Rueter participated in a project to identify and evaluate alternative incentive mechanisms which might be used by the Nuclear Regulatory Commission (NRC) to induce its licensees to improve their compliance with established NRC regulations.

**Evaluation of Supplier Inspection Program** - Under subcontract to TRW, Inc., Dr. Rueter assisted in an evaluation of the structure and performance of the NRC's Licensee Contractor and Vendor Inspection Program.

**Exploratory Study of National Scientific Research Process** - Under subcontract to Decision Sciences Consortium, Inc., Dr. Rueter participated in an exploratory effort to characterize and model certain aspects of the scientific research process in the United States, with particular emphasis on the NSF's role and involvement in that process.

**Methodology for Evaluating Research Program Performance** - Dr. Rueter was a principal researcher in CONSAD's project to design and pilot test a prototype methodology to evaluate the performance of program elements in NSF's Research Applied to National Needs (RANN) program.

**Pilot Test of Utilization Tracking System** - Dr. Rueter participated in the development and exploratory testing of a system to track the utilization experience of NSF/RANN projects.

**Analysis of Student Financial Aid Procedures** - Dr. Rueter was primarily responsible for CONSAD's assessment of the economic and administrative implications of using estimated income as the basis for awarding student financial aid in Federal student financial aid programs administered by the Department of Health, Education, and Welfare.

## **OTHER RELEVANT EXPERIENCE**

### **Virginia Polytechnic Institute and State University, Economics Department (1968-1971)**

Faculty Member

**Clemson University, Economics Department (1972-73)** Faculty member and a consultant to the Division of Administration of the Governor's Office of the State of South Carolina directing the development of a management information system for the State's Comprehensive Manpower Program.

## **SELECTED TECHNICAL REPORTS AND PUBLICATIONS**

ADifferences in Proficiency Among Liver Transplant Programs: An Analysis of ACenter Effects@ in Data from the Liver Volume of the *1997 Report of Center Specific Graft and Patient Survival Rates@*, paper submitted to Health Resources and Services Administration, U.S. Department of Health and Human Services, RIN 0906-AA32, Docket Number 98-HRSA-01, August 28, 1998.

*Framing A Coherent Climate Change Policy*, Washington University in St. Louis: Center for the Study of American Business, Policy Study Number 141, October 1997.

AClearing the Air: EPA=s Self-Assessment of Clean-Air Policy@, with Robert Crandall and Wilbur A. Steger, *Regulation*, 1996, Number 4.

"Comments on the Current State of Knowledge About the Relationship Between Airborne Particulate Matter and Human Mortality and Morbidity and Implications for Future Research," *Proceedings of the Colloquium on Particulate Air Pollution and Human Mortality and Morbidity* (January 24-25, 1994), Report to California Air Resources Board. Irvine, California: Air Pollution Health Effects Laboratory, Department of Community and Environmental Medicine, College of Medicine, University of California, Irvine, Report Number 95-03, August 1995.

APM<sub>10</sub> Particulates: Are They the Major Determinant of Pediatric Respiratory Admissions in Utah County, Utah (1985-1989),@ with Steven H. Lamm, Thomas A. Hall, Arnold Engel, and Lowell D. White, *Annals of Occupational Health*, Volume 38, Supplement 1, 1994.

AAir Toxics and Public Health: Exaggerating Risk and Misdirecting Policy,@ with Wilbur A. Steger, *Regulation*, Winter 1990.

*Training Decisions System: Development of the Resource Cost Subsystem*, with Steven I. Feldsott and David S. Vaughan. Brooks Air Force Base, Texas: Air Force Human Resources Laboratory, Training Systems Division, AFHRL-TR-88-52, December 1989.

*Research and Development of the Training Decisions System*, with David S. Vaughan, Jimmy L. Mitchell, Robert M. Yadrick, Bruce M. Perrin, J. Ralph Knight, A. John Eschenbrenner, Jr., and Steven I. Feldsott. Brooks Air Force Base, Texas: Air Force Human Resources Laboratory, Training Systems Division, AFHRL-TR-88-50, June 1989.

"Conceptual and Statistical Problems in Identifying Thresholds of Effect for Materials Damage and Soiling," *The American Statistician*, Vol. 39, November 1985.

*Integrated Simulation Evaluation Model Prototype (ISEM-P) of the Air Force Manpower and Personnel System: Overview and Sensitivity Analysis*, with Donald W. Kosy, Georgette E. Caicco, and Charles D. Laidlaw. Brooks Air Force Base, Texas: Air Force Human Resources Laboratory, Manpower and Personnel Division, AFHRL-TR-81-15, July 1981.

*Capacity of Air Force Operational Units to Conduct On-the-Job Training: Development of Estimation Methodology*, with Thomas R. Bell and Edward V. Malloy. Lowry Air Force Base, Colorado: Air Force Human Resources Laboratory, Logistics and Technical Training Division, Technical Training Branch, AFHRL-TR-80-46, October 1980.

*Design of a National Skills Market Model for Air Force Enlisted Personnel*, with R. Gregg Hillman and Thomas R. Bell. Brooks Air Force Base, Texas: Air Force Human Resources Laboratory, Occupational and Manpower Research Division, AFHRL-TR-79-32, September 1979.

*Economic Incentives for Land Use Control*, with Phillip Kushner. Washington, D.C.: U.S. Environmental Protection Agency, Office of Research and Development, Office of Air, Land, and Water Use, EPA 600/5-77-001, February 1977.

*A Benefit-Cost System for Chemical Pesticides*, with Ralph Kennedy, Robert Lowrey, Alan Bernstein, Herbert Cole and Henry F. Smyth. Washington, D.C.: U.S. Environmental Protection Agency, Office of Research and Development, Office of Air, Land, and Water Use, EPA 540/9-76-001, January 1976.

"Externalities in Urban Property Markets: An Empirical Test of the Zoning Ordinance of Pittsburgh," *The Journal of Law and Economics*, Vol. 16, October 1973.

"A Simulation of Municipal Zoning Decisions," with Otto A. Davis, *Management Science*, Vol. 19, December 1972.

"Collusion in the Prisoner's Dilemma: Number of Strategies," with F.T. Dolbear, L.B. Lave, G. Bowman, A. Lieberman, E. Prescott, and R. Sherman, *The Journal of Conflict Resolution*, Vol. 13, June 1969.

"Collusion in Duopoly: The Effect of Numbers and Information," with F.T. Dolbear, L.B. Lave, G. Bowman, A. Lieberman, E. Prescott, and R. Sherman, *Quarterly Journal of Economics*, Vol. 82, May 1968.

"Errors of Measurement in the Solow Measure" and "The Aggregation Problem, Some Further Results," with Lester B. Lave, Chapters 6 and 8 in Lester B. Lave, *Technological Change: Its Conception and Measurement*, Prentice-Hall, Inc., 1966.

**Table 1: Costs and Economic Impacts of Pennsylvania Segments of Trans-Allegheny Interstate Line (TrAIL)**

| Resource Category                     | 2007   | 2008                | 2009                 | 2010                | 2011                | Total (2007-2011)    | 2012+                            |
|---------------------------------------|--|---------------------|----------------------|---------------------|---------------------|----------------------|----------------------------------|
|                                       | <b>Construction</b>                            |                     |                      |                     |                     |                      |                                  |
| Materials                             | \$126,311                                      | \$18,181,077        | \$34,953,195         | \$9,346,957         | \$2,116,944         | \$64,724,483         | Annual Operation and Maintenance |
| Labor                                 | \$2,563,162                                    | \$73,394,454        | \$69,710,634         | \$21,602,681        | \$8,310,507         | \$175,581,438        |                                  |
| <b>Total</b>                          | <b>\$2,689,473</b>                             | <b>\$91,575,531</b> | <b>\$104,663,829</b> | <b>\$30,949,638</b> | <b>\$10,427,451</b> | <b>\$240,305,921</b> | <b>\$561,000</b>                 |
| Direct Employment                     | 15   | 183                 | 173                  | 66                  | 21                  | 458                  | -----                            |
| Impact Category                       | Direct, Indirect, and Induced Economic Impacts |                     |                      |                     |                     |                      |                                  |
| <b>Washington and Greene Counties</b> |  |                     |                      |                     |                     |                      |                                  |
| Output of All Industries              | \$4,589,854                                    | \$156,282,801       | \$178,619,291        | \$52,818,651        | \$17,795,487        | \$410,106,085        | \$828,204                        |
| Household Earnings                    | \$1,102,415                                    | \$37,536,810        | \$42,901,704         | \$12,686,256        | \$4,274,212         | \$98,501,397         | \$127,459                        |
| Employment in All Industries          | 28   | 958                 | 1,095                | 324                 | 109                 | 2,515                | 2                                |
| <b>Rest Of Pennsylvania</b>           |  |                     |                      |                     |                     |                      |                                  |
| Output of All Industries              | \$4,536,334                                    | \$154,460,448       | \$176,536,481        | \$52,202,754        | \$17,587,981        | \$405,323,997        | \$1,075,437                      |
| Household Earnings                    | \$1,019,041                                    | \$34,697,969        | \$39,657,125         | \$11,726,818        | \$3,950,961         | \$91,051,914         | \$315,058                        |
| Employment in All Industries          | 28   | 941                 | 1,075                | 318                 | 107                 | 2,469                | 9                                |
| <b>Total Pennsylvania</b>             |  |                     |                      |                     |                     |                      |                                  |
| Output of All Industries              | \$9,126,188                                    | \$310,743,249       | \$355,155,771        | \$105,021,405       | \$35,383,469        | \$815,430,082        | \$1,903,641                      |
| Household Earnings                    | \$2,121,456                                    | \$72,234,779        | \$82,558,828         | \$24,413,074        | \$8,225,173         | \$189,553,311        | \$442,517                        |
| Employment in All Industries          | 56   | 1,899               | 2,171                | 642                 | 216                 | 4,984                | 12                               |

**Table 2: Tax Revenues to Different Taxing Authorities from Pennsylvania Segments of TrAIL**

| Type of Tax  | 2007               | 2008                | 2009                | 2010                | 2011                | Total (2007-2011)    | 2012+               |
|--|--------------------|---------------------|---------------------|---------------------|---------------------|----------------------|---------------------|
| <b>Federal Government</b>  |                    |                     |                     |                     |                     |                      |                     |
| Federal Insurance Contribution Act (FICA) Tax                    | \$324,583          | \$11,051,921        | \$12,631,501        | \$3,735,200         | \$1,258,451         | \$29,001,657         | \$67,705            |
| Federal Unemployment Tax Act (FUTA) Tax                          | \$3,124            | \$106,358           | \$121,559           | \$35,946            | \$12,111            | \$279,097            | \$652               |
| Corporate Income Tax   | \$299,200          | \$2,614,600         | \$7,056,000         | \$7,297,500         | \$11,441,500        | \$28,708,800         | \$10,678,500        |
| <b>Total Projected Federal Tax Revenues</b>                      | <b>\$626,906</b>   | <b>\$13,772,879</b> | <b>\$19,809,060</b> | <b>\$11,068,646</b> | <b>\$12,712,062</b> | <b>\$57,989,553</b>  | <b>\$10,746,857</b> |
| <b>Commonwealth of Pennsylvania</b>                              |                    |                     |                     |                     |                     |                      |                     |
| Personal Income Tax and Unemployment Compensation Tax - Employee | \$67,038           | \$2,282,619         | \$2,608,859         | \$771,453           | \$259,915           | \$5,989,885          | \$13,984            |
| Unemployment Compensation Tax - Employer                         | \$16,743           | \$282,394           | \$322,754           | \$95,440            | \$32,155            | \$749,486            | \$2,841             |
| Sales Taxes  | \$273,786          | \$9,322,297         | \$10,654,673        | \$3,150,642         | \$1,061,504         | \$24,462,902         | \$57,109            |
| Corporate Income Tax   | \$87,912           | \$768,231           | \$2,013,984         | \$2,082,915         | \$3,265,731         | \$8,218,773          | \$3,047,949         |
| <b>Total Projected Pennsylvania Tax Revenues</b>                 | <b>\$445,478</b>   | <b>\$12,655,541</b> | <b>\$15,600,270</b> | <b>\$6,100,450</b>  | <b>\$4,619,306</b>  | <b>\$39,421,046</b>  | <b>\$3,121,883</b>  |
| <b>Local Governments in Washington and Greene Counties</b>       |                    |                     |                     |                     |                     |                      |                     |
| Earned Income Tax  | \$11,024           | \$375,368           | \$429,017           | \$126,863           | \$42,742            | \$985,014            | \$1,275             |
| Emergency and Municipal Services Tax                             | \$941              | \$32,031            | \$36,609            | \$10,825            | \$3,647             | \$84,053             | \$73                |
| Municipality/School District Real Estate Taxes                   | \$54,010           | \$1,893,042         | \$3,994,915         | \$4,616,450         | \$4,825,855         | \$15,384,273         | \$4,825,855         |
| County Real Estate Property Tax                                  | \$12,685           | \$444,618           | \$938,284           | \$1,084,263         | \$1,133,446         | \$3,613,296          | \$1,133,446         |
| Subtotal for Washington and Greene Counties                      | \$78,661           | \$2,745,059         | \$5,398,825         | \$5,838,401         | \$6,005,691         | \$20,066,636         | \$5,960,648         |
| <b>Local Governments in Rest of Pennsylvania</b>                 |                    |                     |                     |                     |                     |                      |                     |
| Earned Income Tax  | \$16,712           | \$569,047           | \$650,377           | \$192,320           | \$64,796            | \$1,493,251          | \$5,167             |
| Emergency and Municipal Services Tax                             | \$783              | \$26,672            | \$30,484            | \$9,014             | \$3,037             | \$69,991             | \$268               |
| Subtotal for Other Pennsylvania Counties                         | \$17,496           | \$595,719           | \$680,861           | \$201,334           | \$67,833            | \$1,563,242          | \$5,435             |
| <b>Total Projected Local Tax Revenues</b>                        | <b>\$96,156</b>    | <b>\$3,340,778</b>  | <b>\$6,079,686</b>  | <b>\$6,039,735</b>  | <b>\$6,073,523</b>  | <b>\$21,629,878</b>  | <b>\$5,966,084</b>  |
| <b>Total Annual Projected Tax Revenues</b>                       | <b>\$1,168,541</b> | <b>\$29,769,198</b> | <b>\$41,489,016</b> | <b>\$23,208,831</b> | <b>\$23,404,892</b> | <b>\$119,040,478</b> | <b>\$19,834,823</b> |