GEORGE MASON UNIVERSITY

Office of Sponsored Programs

4400 University Drive, MS 4C6, Fairfax, Virginia 22030
Phone: 703-993-2988; Fax: 703-993-2296

November 15, 2010

Virginia Coal and Energy Commission
c/o Ellen Porter, Division of Legislative Services
910 Capitol Street, 2nd Floor
Richmond, Virginia 23219

Dear Ms. Porter:

Enclosed please find a formal proposal submitted to the Virginia Coal and Energy Commission on behalf of Dr. James Witte, Director, Center for Social Science Research, George Mason University. This is in reference to his proposal entitled, **"Socioeconomic Study of Impact of Uranium Mining and Milling Operations on Quality of Life and Economic Well-being in Chatham, Virginia."**

George Mason University believes the project proposed herein is fundamental research as defined in National Security Decision Directive 189, and to our knowledge, does not require that we obtain an export license under EAR or ITAR. If the Virginia Coal and Energy Commission believes that our performance or deliverables under this project are subject to export control regulations, and therefore not eligible for the fundamental research exclusion, we request written confirmation to that effect.

If you have any questions regarding the technical portion of this project, please feel free to contact Dr. Witte at 703-993-2993; questions regarding budget, university policies and procedures, should be directed to Anjali Satija, Research Administration Manager, Pre-Award, Office of Sponsored Programs at 703-993-9309.

Sincerely,

Carol-Ann Courtney
Assistant Director, Pre-Award

Enclosures

cc: J. Witte

Proposal for the Socioeconomic Study of Impact of Uranium Mining and Milling Operations on Quality of Life and Economic Well-being in Chatham, Virginia

For: the Virginia Coal and Energy Commission
By: Center for Social Science Research, George Mason University

1. Contact information for the offeror;

James C. Witte, Ph.D.
Center for Social Science Research
George Mason University
4400 University Drive
Fairfax, VA 22030
Telephone: 703.993.2993
Email: jwitte@gmu.edu

2. Organization's history, background, and experience

Work will be performed by **the Center for Social Science Research** (CSSR) at George Mason University (GMU), a public university with four campuses in the Northern Virginia area. CSSR is an interdisciplinary research center in the College of Humanities and Social Sciences. CSSR provides a platform that brings together social science theories and methods, applying them to pressing social, behavioral, and political problems. The Center draws on faculty located within various disciplines —sociology, political science, psychology, communications, public policy and administration, management and other fields— bringing their expertise to bear on the needs of governmental organizations, businesses, non-profit foundations, and community groups. In this particular study, CSSR will collaborate with the Economics Department at GMU.

There are several qualities that make CSSR stand out from other research and data compilation companies:

- ***Focus on research methods***. All of our projects are designed and supervised by professionals with a background in quantitative and qualitative research methods. In every case, projects are designed keeping in mind the best means to obtain data that are representative, reliable, valid and well suited to quantitative and qualitative analysis.
- ***Focus on quality***. The Center for Social Science Research seeks to build its reputation as a supplier of high quality research that is responsive to the needs of community clients as well as the needs of the residents of Northern Virginia. In order to build on this reputation, the quality of the research produced through the Center is considered of the utmost importance.
- ***The OnQ (Online Questionnaire) survey tool***. Initially developed with support from the National Science Foundation, *OnQ* is an extremely powerful and successful survey authoring and deployment tool that serves as a database driven backend for web and phone surveys.
- ***Inter-disciplinary approaches***. Projects conducted by the Center for Social Science Research draw on theoretical and methodological innovations from all of the social sciences, including the study of communities, family life, social control, and political institutions.
- ***Access to resources***. Because the Center for Social Science Research is an integral part of a vibrant university and campus, it can draw on a wide array of resources. These include access to full-time and part-time faculty, students, support staff, and university infrastructure [e.g., computing, human resources, sponsored programs, etc].

Chartered with its current name and mission in 2004, CSSR was previously the Northern Virginia Survey Research Lab, which was established in 1987 under the auspices of the Department of Sociology and Anthropology. Since 2004, CSSR has provided a range of research-related services to local government agencies, private organizations, and academic researchers. CSSR provides customized research projects

tailored to meet client needs, utilizing both its internal research capacity (e.g., the survey research lab), and the facilities and professionals available throughout the university. CSSR's research team will work together with the Virginia Coal and Energy Commission and any other relevant State personnel to plan and implement the proposed stuy of uranium mining and milling on the Coles Hill Property in Virginia. The proposed research team is described in Section 6.

3. Examples of previous comparable work

Recent examples of comparable projects performed by CSSR **include:**

Pandemic Flu Preparedness in Fairfax County, Virginia (2010)

Research Focus: Residents' knowledge and behavior related to emergency preparedness, in general, and to pandemic flu preparedness, in particular. In addition, respondents were asked about their participation in and familiarity with emergency preparedness education and outreach efforts conducted by the Fairfax County Health Department.

Methods: Telephone survey of 1,588 residents of Fairfax County. Respondents were interviewed in seven languages (Spanish, Arabic, Farsi, Urdu, Chinese, Korean and Vietnamese), as well as in English. Survey responses weighted by education, race/ethnicity and length of residency in the County to account for demographic differences in nonresponse. CSSR provided the final study report, which was then transferred to the U.S. Center for Disease Control, sponsors of the Pandemic Flu Preparedness program in Fairfax County.

Survey of Residents in McLean Community Center (MCC) Tax District (2010)

Research Focus: Respondents were asked about their current use of facilities and services, as well as their opinions about the construction of new facilities.

Methods: Telephone survey of 600 randomly selected residents of McLean, VA. In addition, a web survey was made available through the MCC web site allowing any resident to provide input.

Survey in Greenville County for the MS4 NPDES permit (2010)

Research Focus: Data collection and analysis for a survey to determine public awareness of storm water issues and identify needs for public education and information. CSSR participated in design of the survey, data collection and preparation of data and tables for analysis..

Methods: Telephone survey of 400 randomly selected residents of Greenville County, SC. Survey responses weighted by education, race and gender to account for demographic differences in nonresponse.

Immigrant Entrepreneurship in the DC Metro Area (2009)

Research Focus: This study sought to examine the characteristics of immigrant business owners and their businesses.

Methods: Telephone surveys with business owners from Latin America, Korea and Vietnam in the Washington, D.C. metropolitan region. A sample of businesses was selected based upon Dunn & Bradstreet listings. Questionnaires used in the study were translated into Korean, Vietnamese and Spanish. A total of 587 interviews were completed: 163 with Korean business owners (28%), 140 with Vietnamese owners (24%) and 284 with Latino business owners (48%).

Enabling TV meteorologists to provide viewers with climate change-related science education based on informal science education "best practices." (2009 – 2011)

Research Focus: In collaboration with GMU's Center for Climate Change Communication, the CSSR is part of a National Science Foundation funded project that seeks to understand the role that TV meteorologists play in shaping public knowledge and attitudes on climate change.

Methods: Web-based surveys of TV meteorologists and news room directors; pre and post test phone surveys of viewers in a single TV media market.

The RAND Corporation: Satisfaction with Police Services (2010)

Research Focus: This research was contracted by the RAND Corporation in order to look at satisfaction with police services in various locales in the United States. This survey included two groups, those who previously had contact with the police and those who were just asked their opinion about their local police department.

Methods: Telephone and mail surveys in four U.S. communities.

Sharing Stories, Exploring Difference: Residents' Experiences in Local Communities (2009)

Research Focus: *Community Identity:* To understand how residents' backgrounds (for example, culture and language) affect their experiences in their communities

Methods: Participatory video project that involves interviewing diverse residents in a variety of neighborhoods. The project serves as part of a broader history about particular communities, in Fairfax County.

Identifying Health Needs in Local Clinics through a Community-University Partnership (2010)

Research Focus: *Health Disparities*: To understand local health needs and barriers faced by diverse populations.

Methods: Staff interviews and patient surveys in Community Health Care Network (CHCN) clinics that serve low income and uninsured county residents. CSSR continues to work with the CHCN to obtain further funding from the National Institutes of Health for research that focuses on health disparities.

Yes We Can! The Southgate Community Engagement & Leadership Project (2009-2010)

Research Focus: *Social and Community Change*: To identify barriers to engagement and leadership in a culturally diverse area

Methods: Participatory research with community residents; door-to-door interviewing and focus groups, analysis, presentation and planning action steps. CSSR continues to support community efforts by providing technical assistance as needed (e.g., grant writing)

Fairfax County Neighborhood Initiatives Program: A Model for Collaborative Community Change (2009-2010)

Research Focus: *Social and Community Change*: To examine the implementation of neighborhood-focused approaches to resident engagement and community building efforts in five culturally and economically diverse areas

Methods: Community-based approach; multi-methods, including surveys, face-to-face interviews and focus groups. This study serves as a model and template for future neighborhood focused work

Fairfax County Quality of Life (QOL) Indicators Pilot Project(2009-2010)

Research Focus: *Community and Economic Development*: To demonstrate the value of using neighborhood indicators to identify communities in need, plan well-targeted strategies, and track progress towards desired results.

Methods: Compiled 115 social indicators for pilot neighborhoods in Fairfax County; created neighborhood-level data using county and state data sets; geospatial mapping. As funding becomes available we will expand coverage to all Fairfax County neighborhoods, make the information available to the public and provide regular updates and analysis.

4. Client References

Contract Name:	Pandemic Flu Preparedness Survey
Agency:	Fairfax County Health Department
Dollar Value:	$29,117
Dates of Contract:	Dec 23, 2009 to Dec 31, 2010
Contact Person:	Glen Barbour Public Safety Information Officer Fairfax County Health Department 10777 Main Street, Suite 203 Fairfax, VA 22030 Tel: (703) 246-8635 Fax: (703) 273-0825 Cell: (571) 722-5832 glen.barbour@fairfaxcounty.gov

Contract Name: Community Center Survey of McLean Tax District Residents
Agency: McLean Community Center
Dollar Value: $34,096
Dates of Contract: May 1, 2010 to April 30, 2011
Contact Person: George A. Sachs
Executive Director
McLean Community Center
Tel: (703) 790-0123
george.sachs@fairfaxcounty.gov

Contract Name: Survey in Greenville County for the MS4 NPDES Permit
Agency: Clemson University / Greenville County, SC
Dollar Value: $18,133
Dates of Contract: March 1, 2010 to October 1, 2010
Contact Person: Catherine Mobley
Department of Sociology and Anthropology
Clemson University
Clemson, SC 29634

Contract Name: Enabling TV meteorologists to provide viewers with climate change related science education based on informal science education "best practices."
Agency: National Science Foundation
Dollar Value: $1,115,507.00
Dates of Contract: September 1, 2009 to August 31, 2011
Contact Person: Edward Maibach, MPH, PhD
Director, Center for Climate Change Communication
Distinguished University Professor, Department of Communication
George Mason University
4400 University Drive, Research 1/251, Mail Stop 6A8
Fairfax, VA 22030
Tel: (703) 993-1587
Fax: (703) 993-8300
Email: emaibach@gmu.edu

Contract Name: Interactional Information System: Professional Development for Algebra Progress Monitoring
Agency: US Department of Education (sub-award through Clemson University)
Dollar Value: $222,475.00
Dates of Contract: August 1, 2009 to July 31, 2012
Contact Person: Pamela M. Stecker, PhD
Professor, Special Education Programs
Clemson University
213 Holtzendorff Hall
Clemson, SC 29634

Tel: (864) 656-5110
Fax: (864) 656-2375
e-mail: stecker@clemson.edu

Contract Name: Intergovernmental Agreement for Services between Fairfax County and George Mason University
Agency: Fairfax County
Dollar Value: Open-ended
Dates of Contract: June 30, 2009 to June 30, 2013
Contact Person: Karla Bruce
CRS, Director, Coordinated Services
12011 Government Center Parkway, 10th floor
Fairfax, Virginia 22035-0014

Contract Name: Neighborhood Initiatives Evaluation Project
Agency: Fairfax County
Dollar Value: $100,000
Dates of Contract: July 1, 2008 to June 30, 2009
Contact Person: Karla Bruce
CRS, Director, Coordinated Services
12011 Government Center Parkway, 10th floor
Fairfax, Virginia 22035-0014

Contract Name: Neighborhood Initiatives Evaluation Project
Agency: Fairfax County
Dollar Value: $100,000
Dates of Contract: August 13, 2007 to June 30, 2008
Contact Person: Karla Bruce
CRS, Director, Coordinated Services
12011 Government Center Parkway, 10th floor
Fairfax, Virginia 22035-0014

Contract Name: Responsive Effects to Address Integral Needs in Staffing
Agency: Association of Public-Safety Communications Officials (APCO) International
Dollar Value: $86,826
Dates of Contract: July 1, 2007 to July 1, 2008
Contact Person: Bob Smith
Director of Communication Center & 9-1-1 Services
APCO International
351 N. Williamson Blvd
Daytona Beach, FL 32114
Tel: (386) 944-2486
Fax: (386) 944-2786
Email: smithr@apco911.org

Contract Name: Police Contact Survey
Agency: RAND Corporation
Dollar Value: $34,855
Dates of Contract: December 1, 2008 to November 30, 2009
Contact Person: Robert C. Davis
Senior Social Research Analyst
RAND Corporation
1200 South Hayes Street
Arlington, VA 22202
Tel: (703)413-1100 ext. 5199
Fax: (703)413-8111
Cell: (609)439-8062

Contract Name: High-Tech Immigrant Entrepreneurship in the U.S.
Agency: Corporate Research Board
Dollar Value: $39,999
Dates of Contract: December 1, 2007 to November 30, 2008
Contact Person: Spencer Tracy
President
Corporate Research Board, LLC
118 15th Street, NE
Washington, DC 20002

Contract Name: Amendment #7 to Memorandum of Understanding XX-01-458597-23A between Fairfax County Park Authority and George Mason University
Agency: Fairfax County Park Authority
Dollar Value: $27,771
Dates of Contract: May 2007 to April 30, 2008
Contact Person: Nick Duray
Fairfax County Park Authority
Park Services Division
12055 Government Center Pky
Suite 927
Fairfax, VA 22035-1118
Tel : (703)324-8560
Email : nduray@fairfaxcounty.gov

5. Qualifications, and experience of personnel to be assigned to the project

James Witte, Ph.D., CSSR Director and Professor of Sociology
Dr. Witte was named Director of CSSR in August of 2009. From 2002 through 2009 he was Director of the Survey Lab at Clemson University, Clemson, SC, and holds a Ph.D. in sociology from Harvard University and an M.P.A. from the University of Wisconsin-Madison. While at Clemson Witte was the principal investigator or co-principal investigator for approximately $1.75 million in federal funding from the National Science Foundation, the U.S. Department of Education and U.S. Equal Employment Opportunity Commission. Other significant projects were conducted for South Carolina state and local government units, as well as non-profit and private sector organizations. Witte teaches research methods and survey design, has been an expert witness for the EEOC on employment discrimination statistics in six federal court cases, served for three years on a standing NIH study review panel for Social Science, Nursing, Epidemiology and Methods (SNEM5), and is currently a member of the National Advisory Board for the South Carolina Education Oversight Committee.

As Principal Investigator (PI), Dr. Witte will be responsible for administering the project, including managing all timelines and deliverables, and overseeing the work of the project staff. Dr. Witte will also be the primary point of contact and will be responsible for communications, reports and presentations associated with the project.

Carl Johnston, Ph.D., Postdoctoral Fellow
Dr. Johnston is a post-doctoral research fellow at the Interdisciplinary Center for Economic Science at George Mason University where he studies electricity markets, health care and a wide variety of public economic institutions using experimental economic laboratory and agent-based computer simulation techniques. He received his Ph.D. in economics from George Mason University in 2007. His dissertation, "Medicare Part D: an institutional analysis," used experimental and simulation techniques to examine aspects of the program's design as an economic system. Current work focuses on energy markets, in particular a forthcoming study of electricity deregulation for the National Center for Policy Analysis where Dr. Johnston is a Senior Fellow. Another topic is health care reform, including a significant experimental study presented by the National Federation for Independent Business (NFIB) at a White House healthcare summit in March 2009. Other clients included the Department of Defense, and the Midwest Independent System Operator (electricity market). Prior to graduate school, Dr. Johnston was a research associate at Harvard Business School, an analyst at the consulting firm Innosight founded by HBS Prof. Clayton M. Christensen, and a journalist, editor and Washington Deputy Bureau Chief for Dow Jones Newswires. He received his B.A. from Stanford in 1982.

Dr. Johnston will assist with the literature review and be primarily responsible for the input/output modeling analysis described in this proposal.

Randall Salm, M.B.A., M.S., CSSR Researcher.
Mr. Salm has a M.S. in Conflict Resolution, a MS in Business Administration, a certificate in Process Management, and is currently working on his Ph.D. in Sociology. He currently works as a researcher for CSSR, where he has worked on a major Quality of Life project gathering data on over 115 indicators to measure quality of life in nine local Fairfax County communities, the Kings Park Community Survey Project, Fairfax Neighborhood Initiatives Project, the APCO Employee Staffing and Retention Study for 9-1-1 Call Centers, as well as other local and national research projects. He also works as a part time consultant with SRA International, supporting a variety of federal projects, including EPA bi-national

emergency management preparedness with the Government of Mexico. He is an adjunct faculty in the GMU Institute of Conflict Analysis and Resolution, teaching several conflict analysis and resolution courses. His past work experience includes a variety of management, research, training, and project management experiences, including international relations analyst on exploitive child labor, assistant dean in a technology college, juvenile justice trainer, USAID conciliation specialist, conflict resolution professor, and peace education consultant. He has published books, chapters, articles and reports on conflict resolution, peace education and exploitive child labor. He is fluent in English and Spanish, having worked in Colombia and Panama for seven years.

Mr. Salm will assist with the literature review and stakeholder interviews and will be primarily responsible for the public opinion surveys described in our proposal.

Other CSSR Personnel

Other personnel will be added as needed to complete specific project tasks, including administering surveys and interviews, transcription and data entry. CSSR maintains a group of approximately 20-30 hourly interviewers and research assistants who will be called upon to work on projects as needed. The proposal budget includes resources for 1,667 hours of telephone interviewer time, 208 hours of telephone lab supervisor time to complete the proposed telephone surveys, as well as 588 hours of graduate research assistant time to aid in all aspects of the proposed research.

Outside Consultants

We have identified three consultants who have agreed to provide background information and expertise to guide our analysis of the socioeconomic impact of uranium mining and milling operations. in Chatham, Virginia.

Julian J. Steyn

Dr. Julian Steyn is the President of the Washington, D.C. consulting firm of Energy Resources International, Inc., which he co-founded in 1989. He received Bachelor of Engineering and M.A. degrees from Dublin University, Ireland, and has M.Sc. and Ph.D. degrees in Applied Nuclear Science from the University of Toronto, Canada. For the past several decades he has provided nuclear fuel and uranium supply consulting services to utilities, industry, and government in the U.S. and around the world, including Europe, Australia, Canada, Mexico, Brazil, Japan and Taiwan. He has been an expert witness in numerous litigation and international arbitration proceedings. He was a founding Director in 1982 of IEA of Japan Company, Ltd., Tokyo (IEAJ), and a founding Director of Robertson & Associates, a Colorado resource consulting firm. He was the assistant Resident Engineer during the construction of the Denison uranium mill and the Resident Engineer for the construction of the Stanleigh uranium center, Elliot Lake, Ontario. He has presented more than one hundred publications and talks on nuclear fuel, the uranium market, and nuclear power. He has been a participant in many energy and nuclear power generation debates. He is a member of the International Nuclear Energy Academy, the Atlantic Council of the United States and its U.S-Japan Energy Dialog group, and is listed in “Who's Who in the East”. He and a colleague, Blythe Lyons, assisted Senator Pete V. Domenici in authoring “A Brighter Tomorrow: Fulfilling the Promise of Nuclear Energy”, published on October 6, 2004

Manuel F. Pino

Manuel Pino, is a professor of sociology and Director of American Indian Studies at Scottsdale Community College in Scottsdale, Arizona. Prior to teaching at Scottsdale he worked as an Assistant

Professor at Arizona State University in Tempe in the School of Justice Studies. Manuel Pino is from Acoma Pueblo in New Mexico. Manuel's research orientation is environmental issues and their impact on American Indians. Manuel has published several book chapters, articles in academic journals, articles in environmental publications and Indigenous publications in both the U.S. and Canada. Manuel has worked in the area of American Indians and the environment for the past thirty years with an emphasis on uranium mining and nuclear fuel cycle issues impacting Indigenous Peoples throughout North America. Manuel is currently working with former American Indian uranium miners in New Mexico, Arizona, Washington and South Dakota on health issues related to radiation exposure and in Indigenous communities opposing nuclear waste storage and mining on their lands. Manuel served as a delegate of Indigenous Peoples at the 2001 United Nations World Conference Against Racism in Durban, South Africa and the 2002 United Nations World Summit on Sustainable Development in Johannesburg, South Africa and numerous other international forums involving Indigenous Peoples including the Working Group on Indigenous Peoples and the UN Permanent Forum on Indigenous Issues. Manuel currently serves on the Board of Directors for the Indigenous Environmental Network, Southwest Research and Information Center, Red Rock Foundation, and the Laguna Acoma Coalition For a Safe Environment of which he is a founding member. Manuel recently received the 2008 Nuclear Free Future Award for activism in Munich Germany. Manuel is also a member of the American Sociological Association and the American Indian Professors Association

Stephanie Cooke
Stephanie Cooke began her reporting career in 1977 at the **Associated Press**, first in Augusta, Maine and then Boston. In 1980 she moved to McGraw-Hill in New York as an associate editor for the industry newsletters **Nucleonics Week, NuclearFuel** and **Inside N.R.C**., later becoming chief editor. In 1984 she transferred to London and two years later covered the aftermath of the Chernobyl accident for **Business Week** and **NucleonicsWeek**. She wrote for **Institutional Investor** after leaving McGraw-Hill, but began writing again on nuclear topics for British or European publications such as **GQ**, **the Index of Censorship**, **Readers Digest**, **The International Herald Tribune**, and **The Independent** newspaper. In 2004, Ms. Cooke returned to the United States to complete the book. She is currently editor of **Uranium Intelligence Weekly**, part of the Energy Intelligence Group.

6. Project Study Plan

Our plan of study calls for the production of a final report that brings together data and information from three sources: 1) input/output modeling of the economic effects, including the impact on government services of the proposed project; 2) a review of the literature, interviews with local and regional stakeholders and consultation with experts on the health, environmental, regulatory and social impacts of the project; 3) surveys of the public in the project area as well as statewide to assess public opinion on the costs and benefits of the project. By combining these sources of information our goal is to produce a comprehensive and balanced assessment of the socioeconomic impacts of uranium mining and milling. Each of these sources of information is described in the following three sections. The fourth section details the specific issues to be addressed apart from any specific source of information, as many of these issues will be informed by data from all three sources.

6.1 Review of the literature, consultation with experts and interviews with stakeholders

The first step in producing a comprehensive and balanced assessment of the proposed uranium mining and milling project we will consist of a broad survey of the existing literature on the socioeconomic

impacts of the project. In this process we will draw on a variety of academic, governmental and industry sources. The intent is not to review every single source in this extensive literature, but rather to be comprehensive in the scope of our coverage, to identify the range of potential costs and benefits and to cover the range of estimates of the magnitude of these costs and benefits, as well as the probabilities and uncertainties associated with various estimates.

To facilitate the literature review we have identified three experts (see Section 5 above) in the field, who have agreed to act as consultants on the project. Their role will not only be to guide us to relevant literature, but also to connect us with others who may be able to fill in any gaps in their knowledge. In selecting these experts we have made a concerted effort to find individuals with diverse backgrounds and orientations regarding the socioeconomic impacts of uranium mining and milling. An additional role for the experts will be to assist us in 'translating' highly technical aspects of the literature into a language that is accessible to us, but also for use in our interviews with stakeholders and for developing the survey instruments we will use in our effort to gather public opinion on the proposed mining and milling operation.

Our interviews with stakeholders (e.g., City and County officials, community leaders and representatives of the local business community) will supplement information obtained through the literature review and consultation with experts. The former, and to a lesser degree the latter, will primarily view the proposed project from an external perspective, while our interviews with local stakeholders will provide insight into the project from a local and regional perspective.

6.2 Input/output modeling of economic effects

The investigators will use Regional Economic Models, Inc. (REMI) to create a long-term baseline model of economic performance that can then be compared to a simulation of economic effects caused by the uranium mining and milling activity. For this study, we will use the REMI Policy Insight™ model for Virginia. REMI uses hundreds of sub-programs developed over 20 years to model the regional economy and uses data from the Bureau of Economic Analysis, the Bureau of Labor Statistics, the Department of Energy, the Bureau of Census, and other public sources. As with any input/output model, model results are highly dependent on the assumptions that define the model's parameters. A particular strength of our proposal lies in the range of experts, who will aid us in defining the model's parameters.

REMI Policy Insight is a structural model, meaning that it clearly includes cause-and-effect relationships. The model uses two key assumptions commonly found in mainstream economic theory: households maximize utility and producers maximize profits. In the model, businesses produce goods to sell to other firms, consumers, investors, governments and purchasers outside the region. The output is produced using labor, capital, fuel, and intermediate inputs. The model accounts for many real life factors: when there is an increase in the relative cost of labor, capital or fuel, it leads away from that input to substitutes. (Capital can be substituted for labor, for example.) Economic migration occurs when local labor supply is 1) either too small to accommodate economic activity and wages rise, or the labor market becomes saturated and wages decline. Migration affects the population size. People will move into an area if the real after-tax wage rates or the likelihood of being employed increases in a region.

The cost of doing business for every industry in the model is determined by supply and demand for labor and resulting wage rates in the region. Higher wage rates, may increase prices or reduce profits, depending on the market for the product. In either case, an increase in costs would decrease the share of the local and U.S. market supplied by local firms. The model has many other such feedbacks.

For example, REMI captures multiplier effects, such as those that would occur with a proposal such as the uranium mining and milling project. An employment multiplier is the total change in full-time equivalent employment and is the effect of a change throughout the local economy due to a $1.00 rise in payrolls by Virginia Uranium. A household income (or earnings) multiplier is the total change in household income throughout the local economy from a $1.00 change in household income payment by an export sector. An output (or business) multiplier is the total change in sales generated throughout the local economy by a $1.00 change in export sales of a particular sector.

Multipliers are available for every industry classified by federal statistical agencies. Each industry is assigned a different multiplier based on several factors, including the residency of workforce, the average wages paid, and the degree of regional purchasing—the proportion of intermediate purchases that is satisfied locally. In the context of economic impact studies, an export sector is defined as one whose product or service is sold to a non-local person.

REMI is also a dynamic Computable General Equilibrium (CGE) input/output model that permits an analyst to enter a wide range of highly specific assumptions--such as income and number of employees, tax rates, sales growth and dozens of other variables, for example, livestock per acre--and obtain a long-term (30-year) projection of their effects on any other variable compared to a static baseline projection without the policy changes. From this it is possible to get a full picture of regional final demand, consumption, investment, government spending and regional exports.

REMI is different from other dynamic economic models in that it permits market prices and transactions to be "cleared" along a time path within the simulation using a combination of reasonable assumptions about market structure and well-tested econometric estimations of parameters (national input-output statistics maintained by the Commerce Department).

In Virginia, for example, the REMI model is used by the Hampton Roads Planning District to estimate the impact of potential policy changes on the local economy. The model is frequently used to study taxation, transportation, economic development, energy and environment questions and so is well-suited to the current study. A suggestive list of other regional planning agencies using REMI is available at http://www.remi.com/index.php?page=clients&hl=en_US

The REMI model uses all of the above elements to determine the baseline forecast. Once the baseline is established, investigators can introduce a 'what-if' scenario. The effects of a scenario, for example, the start of uranium mining, are determined by comparing the baseline REMI forecast with an alternative forecast that incorporates the assumptions for the scenario.

To show the effects of a given scenario, these policy variables are given values that represent the direct effects of the scenario. REMI captures the full effects (direct, indirect and induced) on the Virginia economy.

- *Direct effects* are changes in jobs and payroll caused by the primary producers.
- *Indirect effects* are the additional jobs and payroll created by businesses that support the primary company by supplying goods and services, for example food, transportation, construction, and equipment services.
- *Induced effects* occur when employees of the primary producers spend on consumer goods, other property, services and taxes.

Economic impact may be measured in a number of ways: employment, income or output. This study will report Virginia Uranium's (VU's) impact in terms of each of these measures. All of these impacts from the scenario can be added together and compared to the baseline to estimate the effect of VU on Virginia's economy.

6.3 Public opinion surveys

The recently upgraded Computer Assisted Telephone Interviewing (CATI) lab has 15 PC-based interviewing stations with a fully featured web-based CATI system allowing for sophisticated questionnaire design, including skips and branching, randomization of question or response order, sample and quota management, scheduling callbacks, recording call attempts, automatic time zone adjustment, quality assurance, productivity reports, and call monitoring. Typical CSSR telephone surveys are based on random digit dial numbers provided by a national vendor. Each number is called a minimum of nine times in an effort to get a balanced sample and to minimize non-response.

The phone surveys will contain approximately twenty-five substantive questions and a standard set of demographic questions. Survey content will be developed by the CSSR staff in consultation with external subject matter experts. Substantive items will focus on knowledge and attitudes regarding:

- Costs and benefits of the proposed uranium mining and milling operations
- Environmental risks associated with the proposed uranium mining and milling operations
- Health risks associated with the proposed uranium mining and milling operations

These three themes will tap into the most publicly salient, specific issues identified below in Section 6.4. Information from the subject matter experts and our interviews with stakeholders will aid us in wording items so that they reflect specific aspects of the proposed uranium mining and milling operations. Members and staff of the Virginia Coal and Energy Commission will be provided the opportunity to review the survey instrument before it is fielded.

We propose to conduct 1,000 random digit dial telephone surveys using a stratified sample design—600 surveys to be conducted in Pittsylvania County and the independent city of Danville and another 400 surveys in the remainder of the State. Demographic characteristics of the realized sample will be compared to U.S. Census Bureau and sample weights will be calculated to adjust results to reflect any systematic differences in response rates according to demographic characteristics.

A slightly modified version of the public opinion survey will be conducted as a web based survey with County Supervisors in Pittsylvania County and the five contiguous counties in Virginia, as well as City Council members in the City of Danville. These public officials will all be contacted by email and asked to participate in the study. The aim here is twofold: first, though some of these officials will have been interviewed as relevant stakeholders, the survey will allow them to anonymously express their views; second, with many of the same questions as the public opinion survey we will be able to assess the extent to which the public responses map on to this group of elected officials.

6.4 Specific issues to be addressed

Data from the three sources described above will address the following issues:

I. Economic Development

A. The number and types of jobs created directly by the mining and milling operation and the associated payrolls.
B. The number, types, and geographic locations of jobs created indirectly by the mining and milling operation in all sectors including retail and wholesale trades, the construction industry, and government.
C. The number and types of all such jobs likely to be filled by current residents and those likely to be filled by outside workers.
D. The number and types of jobs that might be lost due to contraction or closure of existing businesses.
E. Revenue generated from spending and capital investment made directly and indirectly by the uranium mining and milling operation.
F. The impact on local and state tax revenues.
G. The impact on real estate values, land use potential, the housing market, and the construction industry, including any loss of value to those properties downstream or downwind from the mining operation.
H. The impact on both direct and indirect employment levels and revenue generation after the cessation of active mining and milling operations.
I. Expected duration of mining and milling operations given 119 0 million pound estimated deposit and normal production rates.

II. Government Services and Regulation

A. The local and state government costs for regulation and monitoring of mining, milling, tailings management, closure and aftercare, and any associated liabilities.
B. The impact of increased use and costs for any infrastructure and services upgrade.
C. The impact on public schools including funding and educational opportunities.
D. The local and state government costs for contingency planning and disaster preparedness.
E. A review of the potential costs to upstream and downstream localities resulting from the mining and milling operation.
F. A review of the potential costs and determination of the parties responsible for remediating any potential environmental damage.
G. A review of potential sources of funding to offset the costs identified above.
H. The responsibilities and liabilities of key parties involved, including mining companies, local and state government, and federal government.

III. Public Health and Environment

A. The costs of health care and illness due to potential negative impacts from the uranium mining and milling operation.
B. A review of the quality of life impacts from health risks attributable to the mining and milling operation for employees and residents.
C. The impact on quality of life from detrimental environmental consequences.

D. The impact on natural landscapes, scenic appeal, recreation, and tourism including wildlife and hunting, fishing, boating, and places of historical interest.
E. A review of any environmental justice impacts.
F. A review of post-closure procedures to ensure public health and safety.

IV. Social Impacts

A. The effects on internal and external image of the region, i.e., belief that area remains a safe place to live, work, and invest.
B. Public confidence in the company to control adverse effects and the ability of government to properly regulate such effects.
C. The impacts on private schools (see II above with regard to public schools), local institutions and potential increases in socially undesirable activities.
D. The impact on aesthetics and overall quality of life issues.

Tasks to be performed	Timeframe/Milestones	Personnel Responsible
1. Economic development analysis		
Identify similar uranium production operations as case studies of economic development	Month 1	Johnston, Witte, Salm
Identify expected duration of uranium mining and milling operations.	Month 1	Johnston
Identify job types and numbers of workers employed directly in mine and in related sectors	Month 2-3	Johnston
Identify local skill capacity and labor availability in Chatham, VA area	Month 2-3	Johnston, Salm
Identify types and numbers of jobs lost due to mining operations	Month 2-3	Johnston
Identify revenue and capital investment arising from mining operations	Month 4-5	Johnston
Identify local and state tax revenue generated from mining operations.	Month 4-5	Johnston
Identify positive and negative effects on real estate, land use, housing markets and construction industry.	Month 4-5	Johnston
Identify local perceptions and attitudes on economic development issues, including labor, spending, taxes, real estate, land use, construction,	Month 6-8	Johnston, Witte, Salm,
2. Government services and regulation analysis		
Identify similar uranium operations as case studies of government services and regulation	Month 1	Johnston, Salm, Witte
Identify responsibilities and liabilities of key parties involved in mining operations, including the mining company and government entities.	Month 2	Johnston, Salm, Witte
Identify local and state government costs for regulating and monitoring the full range of uranium production operations	Month 2-3	Johnston, Salm
Identify impacts on infrastructure and services	Month 2-3	Johnston, Salm
Identify impacts on public schools	Month 2-3	Salm
Identify government costs for contingency planning and disaster preparedness	Month 4-5	Salm
Identify potential costs to upstream and downstream localities	Month 4-5	Salm
Identify potential costs of and responsibilities for potential environmental damage	Month 6-8	Johnston, Salm
Identify possible funding sources to mitigate above government services and regulation costs	Month 9-10	Johnston, Salm

Identify local and statewide public attitudes on government services and regulation needed for uranium mining and milling operations in VA.	Month 6-8	Salm, Witte
3. Public health and environment analysis		
Identify costs to health care and illness due to mining operations	Month 2-3	Johnston, Salm
Identify quality of life factors and health risks for employees and residents from mining operations	Month 2-3	Salm
Identify quality of life factors from detrimental environmental consequences	Month 4-5	Salm
Identify impact on landscapes, wildlife, recreation and history from mining and milling operations	Month 4-5	Salm
Identify environmental justice effects from mining and milling operations	Month 6-8	Salm
Identify closure and post-closure procedures needed for public health and safety.	Month 6-8	Salm
Identify local public attitudes on public health and environmental safety issues for uranium mining and milling operations in Chatham, VA.	Month 6-8	Salm, Witte
4. Social impacts analysis		
Identify theoretical framework and methods for analysis of specific social impact issues	Month 2-5	Salm, Witte
Identify public attitudes on the image of the region, including as a place to live, work and invest	Month 6-8	Salm
Identify public confidence levels in the company's ability to control for adverse effects and government's ability to regulate uranium mining operations	Month 6-8	Salm
Identify impacts on private schools and local institutions	Month 4-8	Salm
Identify impacts on aesthetics and overall quality of life	Month 4-8	Salm

6.5 Analytical approach

Corresponding to the variety of types of information we propose to collect, our proposal calls for the use of a range of analytical techniques—each appropriate to a specific type of information—to interpret and assess the data.

Our analysis of information obtained through a **review of the relevant literature, consultation with experts and interviews with stakeholders** will rely on content analysis procedures to identify key themes in these materials. As noted above, these themes will inform the development of the public opinion survey instruments as well as alternative scenarios of the REMI input/output model. In addition a summary of these materials will be included in the final report.

In our analysis of the **public opinion data** we will focus on three themes.

- What are the overall patterns of knowledge, belief and concern with the costs and benefits of the proposed uranium mining and milling operations, as well as with the associated environmental and health risks. The primary aim here is produce a descriptive picture of public perceptions of the project. How much are they aware of the various costs, benefits and risks? What do they believe would be the outcomes of pursuing or not pursuing the proposed mining and milling operations? What are the concerns they have about the project? These are essentially univariate questions and our focus will be on looking for significant differences in rating and ranking of the public's knowledge, belief and concern with different aspects of the proposed project.
- Next, we will be looking for variation within these patterns of knowledge, beliefs and concern. The issue, here, is to consider the degree to which these vary with respondents' location (in Pittsylvania County and the independent city of Danville vs. the remainder of the State), and other, relevant demographic characteristics of the respondents (e.g., level of education, employment status, age). Along with bivariate relationships, which will be tested for statistical significance, we will also consider multivariate relationships (e.g., if the relationship between location and knowledge, beliefs and concerns varies with respondent education). As most survey items measuring knowledge, beliefs and concerns are categorical, these analyses will primarily rest on chi-square (bivariate) and logistic regression (multivariate) techniques to assess statistical significance. If the items in the final survey instrument lend themselves to combination into indexes of knowledge, belief and concern, then t-tests or ANOVA (bivariate) and Ordinary Least Squares (multivariate) techniques may be used as well.
- Finally, we will compare the general, public opinion data with that of the stakeholders. Our emphasis here will be on identifying potential disconnects between the two groups with regard to relevant knowledge, beliefs and concerns. When warranted we will use chi-square or t-test statistics to determine if these differences obtain statistical significance.

The analysis of the **input/output model** is tied to the data collected through our literature review and discussions with subject matter experts. The bulk of the investigators' time will be spent gathering estimates of the relevant economic dimensions of the uranium mining project using the technical production modalities suggested by our experts as "most likely."

This information will then be used to frame different "scenarios" to be decided with input from the client. Scenarios might include simulations of economic conditions under high or low uranium prices, fast or slow production, investor default, and/or natural disasters and unplanned release of toxins.

In turn, these scenarios will permit estimates of primary inputs, including value and size of labor inputs, investment in production capital and infrastructure, current availability of those inputs within the region and imports of marginal labor, the value of any local, state, and/or government subsidies, and the amount of marketable uranium output.

The model will then be able to convert this information into outputs including tax revenues, marginal income (including knock-on employment from secondary business and infrastructure development), final consumption, and net regional exports given high, median, and low estimates of uranium prices. This sample will allow for estimates of response patterns with a margin of error of approximately $\pm$ five percent in each strata and approximately $\pm$ three percent for the State as a whole.

7. Statement of Assumptions and Timeframe

A number of major assumptions exist for proposed study.

1. Much of the analysis is contingent on the type of mining and milling operation implemented by the mining company. For example, the *Technical Report on the Coles Hill Uranium Property*, prepared for Santoy Resources, LTD and Virginia Uranium, Inc.(29 April 2009), indicates that it is unclear whether acid or alkaline leaching will be used in the project. Similarly, while the report indicates that only underground mining will be permitted on 652 acres of the 2,940 total acres of the Coles Hill Uranium Property, it is unclear whether underground mining or just surface mining operations are foreseen for the bulk of the property. Since a final determination will not be available during the timeframe for this study, assumptions will need to be made in this regard for the economic, governmental regulation, environmental and social impact assessment.
2. The amount of uranium deposits, and speed and duration of mining and milling operations impact economic and government impact estimates. The estimated 119 million pounds may be mined and processed in a relatively short term period depending on the type and scope of mining and milling operations.
3. An effective analysis of government services and legislation is contingent upon an assessment of legal responsibilities. This report attempts to summarize current legal liabilities of uranium mining companies and government entities, but is not an authoritative legal finding on such issues. Given Virginia's lack of history on uranium mining and general framework for business liability, responsibilities and cost estimates for potential environmental damages are contingent on uncontrollable factors for this study.
4. A review of both closure and post-closure procedures is necessary to assess public health and safety issues.
5. Since there is no experience with large scale uranium mining in a non-arid U.S. environment there is a degree of uncertainty as to the degree to which the regulatory framework should or will be altered to address this aspect of the situation. Moreover, there will be a need to make some assumptions about the nature of this risk.
6. Assessment of social attitudes and opinions is necessary at both the local (Chatham and Pittsylvania County, VA) and state levels to fully understand public attitudes regarding uranium mining and milling operations.

A distinct advantage of the input/output modeling described in Section 6 is that it lends itself to a systematic exploration of key assumptions such as those found in item 1. Sensitivity analyses will be conducted to determine the extent to which the economic impacts of the proposed mining and milling operations vary with different assumptions. Similarly, we will develop the survey instrument so as to poll the general public with regard to different scenarios for the proposed project based on different sets of assumptions.

The timeline below summarizes the research schedule for this project. In general, the first month will be used to identify relevant case studies or bench mark examples that can be used as comparative models for analyzing economic factors, government services and regulatory issues, public health and environment factors, and social issues. Such case studies depend on whether the proposed uranium mining and milling operations use in situ leaching or underground mining methods. Potential bench mark examples may include mining operations in Nebraska, Texas, Utah and Wyoming, with their attendant governmental and environmental actions, and social impacts. A detailed work plan identifying data needs and staff responsibilities will also be developed on month one. Months 2 - 3 will be used to solidify research frameworks for economic, governmental, public health, environmental and social issues. Specific data requirements will be determined. During months 4 - 5 focus groups will be implemented to confirm relevant issues, attitudes and concerns of local and state wide public audiences. The telephone survey design will also be designed in months 4 - 5. For issues not dependent on public input (i.e. econometric modeling), the full data collection and analysis process will be initiated in months 2 – 5. Months 6 - 8 will be used to implement the telephone surveys, and continue data collection and manipulation of econometric models. Months 9 - 10 will entail data analysis of all quantitative and qualitative data collected to date, and identify and respond to any unfilled data gaps. Months 11 - 12 focus on report preparation and finalization. The final report will be submitted by Dec. 1, 2011 and, beginning in the second month, monthly progress reports will be submitted on or before the 5th of the month.

Summary Project Timeline **Month**

Task	1	2	3	4	5	6	7	8	9	10	11	12
Economic Development												
Identify similar uranium production operations as bench mark studies												
Identify expected duration of uranium mining and milling operations.												
Identify job types and worker numbers employed directly & indirectly												
Identify local skill capacity and labor availability in Chatham, VA area												
Identify types and numbers of jobs lost due to mining operations												
Identify revenue and capital investment arising from mining operations												
Identify local and state tax revenue generated from mining operations												
Identify effects on real estate, land use, housing and construction												
Identify local attitudes on economic development issues												
Economic development data analysis												
Government services and regulation												
Identify similar uranium operations as bench mark studies												
Identify responsibilities and liabilities of key parties												
Identify local and state government costs for regulating and monitoring												
Identify impacts on infrastructure and services												
Identify impacts on public schools												
Identify govt. costs for contingency planning and disaster preparedness												
Identify potential costs to upstream and downstream localities												
Identify costs and responsibilities for potential environmental damage												
Identify funding sources to mitigate govt. services and regulation costs												
Identify local and state public attitudes on govt. services and regulation												
Government services and regulation data analysis												
Public health and environment												
Identify costs to health care and illness due to mining operations												
Identify quality of life and health risks for employees & residents												
Identify quality of life factors from detrimental environ. Consequences												
Identify impact on landscapes, wildlife, recreation and history												
Identify environmental justice effects of mining & milling operations												
Identify closure and post-closure procedures needed for public health												
Identify local public attitudes on public health and environ. Safety												
Public health and environment data analysis												
Social impact												
Identify framework and methods for analysis of specific social issues												
Identify public attitudes on the image of the region												
Identify public confidence in company's ability to control effects												
Identify impact on private schools and local institutions												
Identify impact on aesthetics and overall quality of life												
Social impact data analysis												
Preparation of draft and final reports												