

**THE COMMONWEALTH RESEARCH  
COMMERCIALIZATION FUND:**

**ADVANCING TECHNOLOGY AND ECONOMIC  
DEVELOPMENT IN VIRGINIA BY INVESTING IN HIGHER  
EDUCATION RESEARCH**



**ANNUAL REPORT  
JULY 1, 2009 – JUNE 30, 2010**

**Submitted by the Fund Administrator:  
Center for Innovative Technology  
The Commonwealth of Virginia  
Innovation and Entrepreneurship Investment Authority  
October 1, 2010**

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## EXECUTIVE SUMMARY

In accordance with Section 2.2-2233.1 E of the Code of Virginia, the Center for Innovative Technology (CIT) respectfully submits this report regarding the performance of the Commonwealth Research Commercialization Fund (CRCF) in FY 2010.

The predecessor of CRCF, the Commonwealth Technology Research Fund (CTRF), was created in the 2000 Session of the General Assembly. Its purpose was to attract public and private research funding for institutions of higher education in order to increase technological and economic development in Virginia. Awards from the Fund could be made to Virginia public institutions of higher education or their associated intellectual property foundations. The CTRF was renamed in the 2009 Session of the General Assembly to the Commonwealth Research Commercialization Fund (CRCF). At that time its goals were oriented more strongly towards commercialization.

This report addresses FY 2010 progress of the four awards made in FY 2008 that remained active; the Virginia Innovation Partnership program, created in FY 2009; and an award made in FY 2010 using remaining funds from an FY 2008 award that was terminated early. The FY 2010 report for each project is on file with the Fund Administrator, and the Table of Grants provided in Appendix A identifies all awards discussed in this report as well as the two FY 2008 awards that concluded prior to FY 2010.

As of this writing, no monies are in place for new awards. The \$1 million for CRCF in the FY 2010 budget was withdrawn during budget shortfall actions, and the FY 2011 and FY 2012 budgets do not include CRCF appropriations.

## BACKGROUND

The Commonwealth Technology Research Fund (CTRF) was created in the 2000 Session of the General Assembly to leverage federal and private investment in research at Virginia's public universities. The ultimate goal of this investment was to increase technological and economic development in Virginia. The original legislation and amended legislation of March 2003 created four Fund components upon which FY 2008 awards were based:

- **Strategic Academic Enhancement Program:** This component was based on the evidence that top-ranked departments are disproportionately successful in attracting external research funds. This program provided funds to help strong departments in Virginia's universities become world-class research organizations. Funding under the strategic academic enhancement program was typically used for recruitment packages for new faculty, purchase of specialized equipment, renovation of laboratories, funding for graduate research assistants, and similar activities.
- **Matching Funds Program:** Under this component, universities applied to the CTRF for matches to federal or private grant proposals that they were preparing to submit. These matching funds not only helped to qualify institutions for grant competitions, they also

reflected the state's and institution's commitment to the project and influenced decision-makers regarding the feasibility and value of the proposed research.

- **Industry Inducement Program:** This component helped universities to upgrade their research capacities in key departments in order to attract specific companies to locate or expand in Virginia.
- **Commercialization Program:** This component enhanced the capability of the universities to commercialize technologies developed through their research.

During the 2009 Session of the General Assembly, the Fund was renamed to reflect an increased role in the promotion of science and technology-based research, development, and commercialization in the Commonwealth. Awards from the Fund could be made for research programs or technologies substantially focused in the following fields: energy, conservation, environment, microelectronics, robotics and unmanned vehicle systems, advanced shipbuilding, or lifespan biology and medicine. The CRCF's components follow.

- **SBIR Matching Fund Program:** For fiscal years beginning with a Fund balance of less than \$7 million, an SBIR matching funds program was designed for Virginia-based technology businesses. Businesses were eligible to apply for an award if they had received a Phase I Small Business Innovative Research (SBIR) award from the National Institutes of Health (NIH) targeted at the development of qualified research or technologies and met other specified criteria.
- **SBIR/STTR Matching Fund Program:** For fiscal years beginning with a Fund balance of \$7 million or greater, an SBIR and STTR matching funds program was designed for Virginia-based technology businesses. Businesses that had received an SBIR or Small Business Technology Transfer (STTR) award targeted at the development of qualified research or technologies and met other specified criteria were eligible to apply for an award.
- **Matching Fund Program:** A matching funds program was designed to assist qualifying institutions in leveraging federal and private funds designated for the commercialization of qualified research or technologies.
- **Facilities Enhancement Loan Program:** This program was designed to assist qualifying institutions and political subdivisions to provide lease or credit guarantees to assist in financing facilities utilized for commercializing qualified research or technologies developed at qualifying institutions.

At the outset of FY 2010, the Fund's \$1 million was subject to budget shortfall action. Thus, decisions on awards were held, pending the fall 2009 decision by the Governor and/or General Assembly regarding whether CRCF monies would be required to alleviate budget shortfalls. The \$1 million was required. The FY 2011 and FY 2012 budgets did not include appropriations for the Fund.

## **2010 HIGHLIGHTS**

### **AWARD PROGRESS**

#### **Job Creation and Retention**

- Eastern Virginia Medical School estimated in its proposal that its BioEclipse project with Hampton University would result in the creation of 125 new jobs in Hampton Roads, starting at a minimum average salary of \$70,000 per year. These jobs were associated with construction of the Proton Therapy Institute.
- Eastern Virginia Medical School estimated that its BioEclipse project with Hampton University will have an annual payroll of approximately \$1.3 million upon opening in fall 2010, and the annual payroll is projected to increase to approximately \$2 million in a year. Jobs include those of radiation oncologists, radiotherapy technologies, and medical physicists, as well as a facility manager and scientific director.
- ContraVac, located in Charlottesville and associated with the University of Virginia (U.Va.) for their SpermCheck® project, employed five people in the Charlottesville area in connection with the program.

#### **Economic Development**

- Hampton University projected that more than 2,000 patients a year will seek treatment at the new facility associated with the CTRF project. Visiting patients and family members will contribute to the local economy through hotel room reservations, meals, and entertainment.
- ContraVac undertook studies on three products during its project. The firm received Food and Drug Administration (FDA) approval to sell one product in the U.S., and it received ISO approval to sell two products in the European Union (EU).
- To date, \$2.4 million in angel investment has been raised by ContraVac and invested in research and development in Charlottesville.

#### **Intellectual Property**

- A patent is being filed related to U.Va.'s Spintronic project, and an invention disclosure is being prepared for in-plane crossovers for magnetic cellular automata.
- Invention disclosure forms were filed at Virginia Commonwealth University (VCU) and Virginia Tech (VT) related to their joint project, a Radiolabelled Carbonaceous Nanomaterials Center.

As of June 30, 2010, award recipients reported expending a cumulative total of \$1,623,762, of which \$687,780 was spent or obligated in FY 2010.

A summary of each award follows.

### **The Development of BioEclipse, the First Biologically Optimized Treatment Planning System for Proton Radiotherapy, Eastern Virginia Medical School**

**Partners: Hampton University and Varian Medical Systems**

**Fund Component: Strategic Enhancement**

Dr. Richard Britten, Principal Investigator, Eastern Virginia Medical School, was awarded \$487,910 from CTRF for this three-year project. The goal of the project is to develop a biologically-based treatment planning strategy to maximize the therapeutic effectiveness of conformal proton treatment. Proton treatment represents the most advanced form of radiation treatment for cancer patients in the United States and is a rapidly expanding treatment modality worldwide. The Proton Therapy Institute at Hampton University (HUPTI), scheduled for commissioning in August 2010, brings this treatment option to Hampton Roads.

The study is designed to obtain the relevant data on the biological response of tumor and blood vessel cells at various positions along the proton beam, and to use that data to develop a modified version of Varian Medical Systems' Eclipse treatment planning system, BioEclipse. BioEclipse will configure proton treatment plans that take into account the variable biological properties of protons at different depth doses. This will be the first biological based treatment planning system that takes into account both cell killing and radiation-induced ischemia.

The project consisted of two key components: 1) obtaining data on the biological depth dose profile of specific proton beams in order to obtain reliable biological weighting factors for tumor tissues at various depths along the proton tracks, and 2) applying these weighting factors to the physical doses at various depths along the proton tracks in order to develop a treatment planning algorithm based upon biological rather than physical depth dose profiles.

In FY 2010, key activities included establishing X-ray dose response curves; modeling data and developing an initial algorithm; establishing the biological depth dose profile of the relevant beam; extending the algorithm to incorporate multiple tissue input parameters; analyzing equipment for optimum means of integrating the initial algorithm; and using new data as input parameters in prototype equipment. The project was on track for FY 2010 activities and milestones, with significant initial findings following earlier work in the project. The team submitted related manuscripts for publication and gave presentations.

Hampton University, the Principle Investigator, and co-investigators hold intellectual property rights associated with U.S. Patent 7,550,752. The patent application was submitted in March 2007 for the concept of biologically based proton treatment planning.

As of June 30, 2010, CTRF expenditures totaled \$314,930, with \$145,904 spent in FY 2010.

## **Towards Establishment of an Industry-State-Federal National Center in Nanoelectronics: Quantum Dot Spintronic Systems, University of Virginia**

**Partners: Micron Technology and the Nanoelectronics Research Initiative**

**Fund Component: Strategic Enhancement**

Dr. Stuart Wolf, Principal Investigator, University of Virginia (U.Va.), was awarded \$425,542 from CTRF for this two-year project. The goals of this project are to demonstrate working prototypes of spintronic switches and to establish, in Virginia, the foundations of a new industry based on the development of new memory and logic devices, based primarily on the spin degree of freedom of the electron. In particular, this project is helping to support the development of novel spin-based magnetic switches that have the potential for very dense, low power logic. Dr.

Wolf's vision includes the establishment of the Virginia Academy for the X-Gate, an academy addressing a new switch to replace the CMOS semiconductor.

In this past year, new ways were proposed by Dr. Wolf's team that take the original ideas for these magnetic switches much further, and they developed intellectual property that is being patented. Work at Virginia Tech (VT) on multiferroic nanopillar and composite thin film heterostructures supported, in part, by this project turned out to be a very desirable path for the development of logic devices. A patent on the team's Reconfigurable Array of Magnetic Automata (RAMA) intellectual property was being filed as of the writing of the report. In addition, a disclosure was being prepared for in-plane crossovers for magnetic cellular automata.

The team received federal funding for related work, including awards from the Army Research Office (ARO), the National Science Foundation (NSF), the Department of Energy (DOE), and the Air Force Office of Scientific Research (AFOSR). In addition to working with VT to develop this new technology, U.Va. worked with large companies, such as Micron Technology, and small firms, such as 4 Wave, Inc. in Sterling, and Passive Sensors Unlimited LLC in Blacksburg.

Discussions with the Nanoelectronics Research Initiative (NRI) were undertaken regarding locating the Virginia Academy of the X-Gate, a proposed research institute at U.Va. that would focus on electronics that are beyond CMOS. NRI accepted a proposal on this topic for funding starting in the fall of 2010, provided that cost share requirements can be met. U.Va. anticipates partnering with VT, Virginia Commonwealth University (VCU), and the College of William & Mary in the Academy. The expansion of U.Va.'s scope to include other novel "beyond CMOS" switches are part of the strategy to make the Academy an important multi-disciplinary center.

As of June 30, 2010, expenditures totaled \$425,542, of which \$220,143 was spent in FY 2010.

## **Precision and Clinical Testing of SpermCheck® Immunochromatographic Devices, University of Virginia**

**Partner: ContraVac, Inc.**

**Fund Component: Technology Commercialization**

Dr. John C. Herr, Principal Investigator, University of Virginia (U.Va.), was awarded \$194,700 from CTRF for this project. The goal of this project was to gain regulatory approval from the Food and Drug Administration (FDA) for three SpermCheck® immunochromatographic devices for home testing of male fertility.

The Virginia biotechnology company, ContraVac, was formed to advance this technology. With matching funds from the firm and manufacturing costs underwritten by Princeton BioMeditech of Princeton, NJ., this project undertook preclinical and clinical development of three point-of-care devices, SpermCheck® Vasectomy (SCV), SpermCheck® Fertility (SCF), and SpermCheck® Contraception (SCC). These are immunochromatographic devices for detecting sperm. The devices are designed to offer convenience, cost savings, and privacy in the evaluation of male fertility in the home setting.

**SpermCheck® Vasectomy.** SpermCheck® Vasectomy completed sensitivity and precision testing, clinical and consumer trials, and received FDA approval for U.S. sales and International Organization for Standardization (ISO) approval for European Union (EU) marketing. A 510(k) notification was submitted to the FDA. The SpermCheck® Vasectomy device was approved by the FDA for marketing in 2008. SpermCheck® Vasectomy is the only FDA-approved product for post-vasectomy sperm monitoring. A manuscript on the clinical and consumer testing of SpermCheck® Vasectomy was submitted to the *Journal of Urology*, was accepted and appeared as the cover article for the December 2008 issue.

**SpermCheck® Fertility.** Prototypes of SpermCheck® Fertility were manufactured and underwent preclinical sensitivity testing for accuracy and reproducibility. After successful configuration of the device, a lot of 2,000 devices was produced and employed in clinical and consumer trials. Results of clinical trials were submitted to the journal *Human Reproduction* and were accepted for publication as the cover article in the March 2010 issue. The dual strip test with both 5 and 20 M/ml strips was approved by the ISO Committee, following inspection of the manufacturing site at Princeton BioMeditech, for marketing in the EU. Sales of the dual strip test have begun. Negotiations are underway with several distributors in Europe.

The 510(k) application for SpermCheck® Fertility was submitted to the FDA in April 2009. The FDA continues to require more data and a new 510k was submitted to the FDA on a single strip SpermCheck® Fertility test in February 2009.

**SpermCheck® Contraception.** Male contraception represents one of the main objectives envisioned in developing SpermCheck® technology: to create a companion diagnostic test to accompany a male contraceptive and improve the overall future acceptability of male contraception. In January 2009 the Contraceptive Development Branch of the National Institutes of Health (NIH) decided to include a SpermCheck® Contraception device with a cutoff of 1 million sperm/ml in their multicenter trial of a long acting progestin/androgen combination male contraceptive [Nesterone + Testosterone Trial]. Data from these studies is expected to flow in during 2010.

ContraVac anticipates hiring at least three new employees in the next year to handle sales and distribution. As sales of these products grow they are projected to fund development of a manufacturing plant by Princeton BioMeditech in Charlottesville's North Fork Industrial Park.

To date, \$2 million in angel investment has been raised by ContraVac and invested in research and development in Charlottesville. Five individuals have been employed in the Charlottesville area in connection with the program.

As of June 30, 2010, expenditures totaled \$194,000, with \$34,449 spent in FY 2010. \$700 remained unspent on this award.

## **A Radiolabelled Carbonaceous Nanomaterials Center (RCNC), Virginia Tech**

**Partners: Virginia Commonwealth University, Carillon Clinic, and IBA Molecular  
Fund Component: Strategic Enhancement**



Dr. Harry Dorn, Principal Investigator, Virginia Tech (VT), was awarded \$200,000 from CTRF for this two-year project. The goal of this joint VT – Virginia Commonwealth University (VCU) project was to establish a Radiolabelled Carbonaceous Nanomaterials Center (RCNC) to prepare new diagnostic and therapeutic radiolabelled samples that would lead to commercial development and improved capabilities in cancer diagnosis and treatment. The tumors to be addressed first by the new technology were gliomas, the most common primary brain tumors and currently incurable.

The initial phase of this work involved the design and engineering of a metallofullerene generator, including the development of separation and functionalization protocols for the radiolabelled particles.

The team developed a new radiopharmaceutical generator facility for both VT and VCU. As part of the project, the team conducted studies that led to the preparation of direct encapsulation of radionuclides in fullerene cages and specifically, the case of radiolabeled Lu-177. Particularly, the team successfully incorporated the  $^{177}\text{Lu}$  radionuclide ( $\beta^-$ emitter) into an endohedral metallofullerene,  $\text{Lu}_3\text{N}@C_{80}$ , utilizing a quartz remote-controlled Krätschmer-Huffman electric-arc apparatus. This new radiolabeled metallofullerene,  $^{177}\text{Lu}_3\text{N}@C_{80}$  was functionalized and conjugated with interleukin-13 ( $^{177}\text{Lu}_3\text{N}@C_{80}$ -TAMRA-IL-13) and a fluorescent (TAMRA) tag. This study was reported in the *Journal of the American Chemical Society* (2010) and allows encapsulated radionuclides ( e.g.,  $^{177}\text{Lu}$  in an f-EMF) to be ready for diagnostic applications in only a 2-3 day period ( $< 1$  half-life).

The major problem encountered in this project was the low radioactivity yields. Although the yields were sufficient for diagnostic applications, they were inadequate for therapeutic studies. In the last year of this work, the team focused on several approaches to improve the overall radioactivity yields, including metathesis reactions as described in this report. Research to achieve a solution led to a successful alternative approach in which the team prepared a multi-modal agent successfully coupling  $^{177}\text{Lu}$  to the f- $\text{Gd}_3\text{N}@C_{80}$  exohedral surface using a bi-functional macrocyclic chelator (DOTA). This exohedral  $^{177}\text{Lu}$  DOTA ligand functions as a therapeutic arm and the endohedral  $\text{Gd}_3\text{N}$  cluster provides a magnetic resonance imaging (MRI) diagnostic arm. The team recently demonstrated very effective brachytherapy with this agent, which was delivered by convection-enhanced delivery (CED) in an orthotopic xenograft brain tumor mice model through extended survival time and histological signs of radiation-induced tumor damage. CTRF funding was essential in arriving at this seminal breakthrough, and the finding could lead to next-generation radiopharmaceuticals for researchers and medical clinicians.

IBA Molecular expressed interest in commercializing this technology, and the team discussed commercialization with several other firms and individuals.

Invention disclosure forms were filed at both VCU and VT for work related to this research.

As of June 30, 2010, CTRF expenditures totaled \$194,396, with \$42,361 spent in FY 2010. \$5,604 remains unspent and will not be drawn upon by this award.

## **A Center for Community Security and Resilience, Virginia Tech**

**Partners: IBM Research and Arlington County**

**Fund Component: Strategic Enhancement**

Dr. James Bohland, Principal Investigator, Virginia Tech (VT), was awarded \$271,965 from the Fund in January 2010 to catalyze the Center for Community Security and Resilience (CCSR). The was established in 2009 by VT, IBM Research, and Arlington County; its mission is to conduct research and create solutions to help secure communities, ensuring they have the capacity to recover and adjust to changes brought about by catastrophic events.

The team's tenet to identify and focus on specific research topics addressed both the technological and societal dimensions of the Center's overall challenge, enhancing community resilience through robust environmental services, critical infrastructure, and health-related services, while safeguarding the individual freedoms embedded in America's democracy.

In FY 2010, CCSR established a digital presence ([ccsr.ncr.vt.edu](http://ccsr.ncr.vt.edu)), convened a workshop with researchers and public safety officials, and based on the findings of that group, solicited and funded a set of five proposals addressing critical needs in community resilience. Each sub-award involves a team of VT and IBM researchers that will engage the emergency response and public safety community in the national capital region and develop proposals for ongoing work. The effort engages the public sector, private industry, academia, and the general public in helping to design, use, and evaluate technology that can and will aid communities as they plan for, respond to, and recover from significantly disruptive events.

The public safety leadership in the northern Virginia area of the national capital region is primarily concerned with two overriding problems that can be addressed by the VT-IBM partnership with Arlington County. First is the challenge of developing and maintaining appropriate situational awareness before, during, and after critical events, including coordination of public and private actions. Second is the overriding influence of key critical infrastructure, such as traffic and electrical systems, in the efficient functioning of communities before, during, and after events. The CCSR recognizes that solutions must be supported by the involvement of the public, and the Center must incorporate a process for continued investment.

In the second half of the effort, project teams supported by CRCF will implement and test new technologies, and the Center will engage advisors, stakeholders, and potential partners in planning for the future.

As of June 30, 2010, CTRF expenditures totaled \$30,676, with an additional \$190,000 obligated through sub-awards.

## **VIRGINIA INNOVATION PARTNERSHIP PROGRAM**

Although the Virginia Innovation Partnership (VIP) program was not fully implemented because of budget reductions, the program is discussed below.

The VIP program was created following discussions between then Secretary of Technology Aneesh Chopra and representatives of Virginia universities serving on the Virginia Research & Technology Commission (VRTAC). Their shared goal was to develop a program to advance commercialization of early-stage university technologies, with the intention of creating economic and social impact in the Commonwealth. The VIP program was under the direction of three Governing Board members from Virginia Tech (VT), the University of Virginia (U.Va.), and SRI International in Harrisonburg.

With goals of creating Virginia-based start-up companies, attracting established corporations to invest in Virginia, and enhancing the licensing potential for technologies, the VIP solicitation was issued in April 2009. Sixty-seven proposals were received from eight universities in May, and the proposal review process commenced in June. Proposals were reviewed by a panel of engaged stakeholders, including venture capitalists, entrepreneurs, business owners, corporate partners, university researchers, and tech transfer professionals, from both within and outside of the Commonwealth. The team’s expected outcomes included enhanced creation of new intellectual property at the rate of at least twenty new disclosures per year, with at least 50% converting to licensing deals.

The panel selected 25 proposals for oral presentations and recommended 18 of those proposals for over \$922,000 in new funding. University matches of over \$1 million were associated with the projects.

The Innovative Technology Authority (ITA) or its successor, the Innovative Entrepreneurship and Investment Authority (IEIA), was to review the recommendations of the VIP Governing Committee and make final award decisions. Criteria associated with proposal review included the following:

- Merit-based awards were to be provided to faculty for innovative research, including translational research.
- Proposals required the collaboration of two co-principal investigators, each of whom were to be from different academic disciplines, in order to stimulate interdisciplinary and intra-institution collaborations.
- Projects or investigators who had formed a company, controlled the primary IP rights, and had professional management/CEO were not eligible to apply.

The guidelines provided that the disciplines enumerated below were eligible for awards. The Chairman of the ITA could authorize awards in other disciplines, provided that such action was reported as required by legislation.

Biotechnology	Information Technology	Energy production and conservation
Environmental technology and sustainability	High performance manufacturing	Bioengineering and Medical Devices
Nanotechnology	Modeling and Simulation	Healthcare and Biosciences
Microelectronics	Security and Safety	Information Assurance

## **Administering the Virginia Innovation Partnership (VIP) Review Process, University of Virginia**

Dr. Thomas Skalak was awarded \$75,000 from CTRF for U.Va.'s administration of the VIP review process. The period of performance, April 27, 2009 – June 30, 2010, encompassed the timeframe for proposal solicitation and review as well as for award management and assessment. The award to U.Va. was made in June 2009, of which \$24,247 was spent by June 30, 2010. Expenditures covered staff time, travel expenses and other review process-related expenses. \$50,753.00 remains unspent from the CTRF award; no additional funds will be spent on this grant, which received a match of \$55,800.

### **ADMINISTRATION**

Administrative activities in FY 2010 focused on support to FY 2008 award recipients regarding administrative and financial matters along with proposal development and award activities for the FY 2010 grant to Virginia Tech. The Administrator also coordinated with U.Va. regarding the VIP program as the Administration and General Assembly resolved FY 2010 budget issues. CIT maintained information about the Fund on its website and provided support to external organizations, state agencies, and researchers from academia and industry that requested information about the Fund and future solicitations. Additionally, CIT collected, reviewed, and assessed annual reports from award recipients in order to develop the Fund Administrator's Annual Report. Throughout the year, CIT provided oversight to ensure compliance with Fund's guidelines and other requirements.

## APPENDIX A

Title	Period of Performance	Lead Institution	Principal Investigator	Total CTRF Award	Academic Match	Private / Other Match	Total Match*
Towards Establishment of an Industry-State-Federal National Center in Nanoelectronics: Quantum Dot Spintronic Systems	2/1/2008 – 6/30/2010*	University of Virginia	Stuart Wolf	\$425,542	\$215,978	\$210,000	\$425,978
Precision and Clinical Testing of SpermCheck® Immunochromatographic Devices	2/1/2008 – 12/31/2009*	University of Virginia	John C. Herr	\$194,700	----	\$194,700	\$194,700
Self Cleansing Intrusion Tolerance-Next Generation Security Technology (SCIT)	3/1/2008 – 2/28/2009*	George Mason University	Arun Sood	\$86,013	\$1,013	\$85,000	\$86,013
The Development of BioEclipse, the First Biologically Optimized Treatment Planning System for Proton Radiotherapy	4/1/2008 – 3/31/2011	Eastern Virginia Medical School	Richard Britten	\$487,910	\$150,000	\$338,000	\$488,000
A Radiolabelled Carbonaceous Nanomaterials Center (RCNC)	2/1/2008 – 1/31/2010	Virginia Tech	Harry Dorn	\$200,000	\$399,399	\$75,000	\$474,399
Glass Extrusion Process Analysis and Optimization Research	5/1/2008 – 3/23/2009*; terminated on 3/23/2009	Virginia Tech / Institute for Advanced Learning and Research	Ronald Moffitt	\$163,959*	\$110,982	\$53,928	\$164,910
Administration of the VIP Review Process	4/27/09-6/30/10	University of Virginia	Tom Skalak	\$75,000	\$75,000	----	\$75,000
Center for Community Security Resilience	1/1/2010 – 12/31/2010	Virginia Tech	James Bohland	\$271,965	\$203,395	\$135,000	338,395
<b>Totals</b>				\$1,905,089	\$1,155,767	\$1,091,628	\$2,247,395

\* Revised period of performance