STATEMENT OF

ROBERT C. DOLENCE

VICE PRESIDENT

LEONARDO TECHNOLOGIES, INC.

BEFORE THE

SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

U.S. HOUSE OF REPRESENTATIVES

How Reliability of the Inland Waterways System Impacts Economic Competitiveness

April 18, 2012

Mr. Chairman and Members of the Subcommittee:

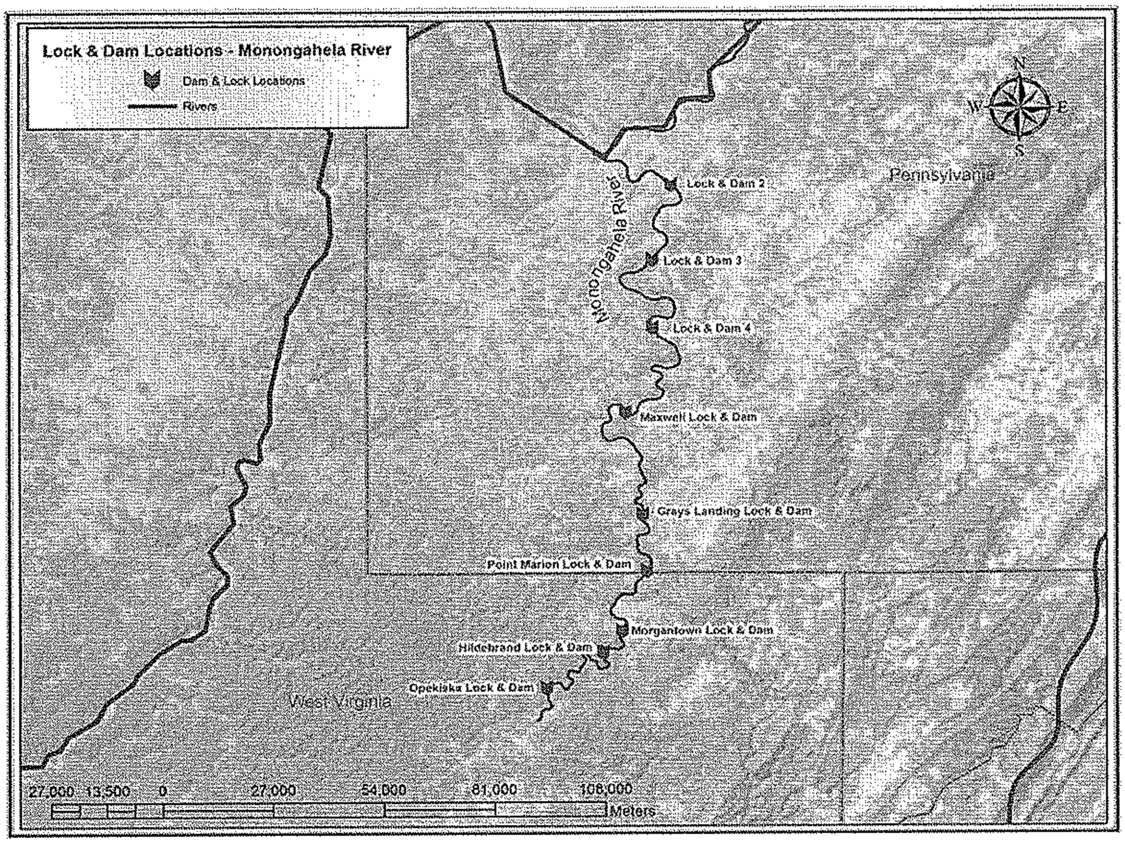
Thank you for inviting me to speak to the Subcommittee today. I have submitted my entire statement for the record, but will keep my opening remarks brief. My name is Robert Dolence. I am Vice President and Principal of Leonardo Technologies, Inc. or LTI. LTI is a small, privately held business incorporated in the State of Ohio with headquarters in Bannock, Ohio, and offices in Montana, Pennsylvania, New Hampshire, New York, Virginia, and West Virginia. LTI is an energy and technology consulting firm focused on the safe, affordable, and environmentally acceptable production and use of energy. Our more than 100 professionals are involved in the fuel and energy cycles from production, upgrading, transporting, utilization of, and disposition of residual materials. Our portfolio of expertise transcends a wide variety of fuels and fuel use technologies including, but not limited to, coal, natural gas, petroleum, biomass, biomass-coal co-firing, renewable energy (solar and wind), energy efficiency, traditional pulverized coal plants, advanced coal fired plants, coal gasification, biomass gasification, fuel cells, electric grid, and electric generation.

On a professional level, I have spent more than 30 years in the energy business. I am a registered professional mining engineer having spent most of my time working in the coal regions of Appalachia as a coal producer, as a federal regulator (Office of Surface Mining – OSM), state regulator (Deputy Secretary for Pennsylvania's Department of Environmental Protection), Research & Development (R&D) Program Manager (U.S. Department of Energy's National Energy Technology Laboratory – NETL), and management and environmental consultant.

I was invited to speak today regarding a study LTI performed in 2011 for the U.S. Army Corps of Engineers, titled, "Measuring the Impact of Monongahela [River] Lock Closures on Forecasts of Utility Steam Coal Consumption, Sourcing and Transportation in the Ohio River Basin[1]." In the 2011 study, LTI was asked to assess the likely impacts to the regional and national electric utility industries and the coal industry that provides fuel to those plants, resulting from a catastrophic failure of any one of the three lock-and-dam sets (#2, #3, or #4 below) on the lower portion of the Monongahela River closest to Pittsburgh, Pennsylvania. These dams

[1] *Measuring the Impact of Monongahela Lock Closures on Forecasts of Utility Steam Coal Consumption, Sourcing and Transportation in the Ohio River Basin*; October 10, 2011; Redacted Report; Contract number: W91237-08-C-0010.

were selected due to their annual historic coal traffic and vulnerability to failure; that is, current risk due to their age and condition.



Actual 2010 data was used "retrospectively" to model potential dam failure impacts. The work was performed in mid-2011 by LTI's Principal Investigator, Dr. Lloyd Kelly, using a proprietary energy modeling system, the Greenmont Energy Model (GEM®)[2]. The highlights of the work follow.

The Monongahela River is a nine-lock tributary of the Ohio River. The navigable portion of the Monongahela River extends 128 miles from Fairmont, West

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[2] GEM® – Greenmont Energy Model, a proprietary model developed by and licensed from Greenmont Energy Consulting of Parkersburg, WV (www.greenmontenergy.com). GEM® simulates the coal and electricity supply/demand balances in the U.S. A description of GEM® can be found at the end of this testimony.

Virginia, to the confluence of the Allegheny and Monongahela Rivers where they form the Ohio River at Pittsburgh, Pennsylvania; a location commonly referred to as "Three Rivers." There are four coal-fired electric power plants on the Monongahela River. Eighty-nine percent (89%) of the river traffic is coal being shipped to these and other plants, as well as commercial, industrial and export markets. It is my understanding that the lowest three lock-and-dam sets closest to Pittsburgh are in the poorest state of repair and more susceptible to a catastrophic failure. After some discussion with representatives of the U.S. Army Corps of Engineers, it was decided to adopt the assumption that such a failure at one of these lowest three lock-and-dam sets would shut down the entire traffic on the Monongahela River because it likely would not be economic to maintain and operate tugboat and barge fleets in isolated stretches on the upper portion of the Monongahela without passage to and beyond the Ohio River System. Therefore, LTI's modeling scenario for the failure mode was one of complete loss of traffic on the Monongahela River.

Before I discuss the quantitative impacts LTI observed from our simulation modeling, it is important to note that our modeling automatically calculates the lowest cost transportation alternative for each of many different coals into every single electric utility plant. This includes finding the lowest cost <u>alternate</u> transportation for those situations where the coal would have traversed a portion of the Monongahela River but now cannot do so in the failure mode scenario where a lock-and-dam set has experienced catastrophic failure. The resulting <u>new</u> least expensive transportation will be at a higher cost than if the Monongahela were open to traffic, and this could either: (a) raise the cost of electric generation using the same coal, (b) cause the plant to choose a different coal to burn, or (c) cause the plant to dispatch less electricity (either in favor of a competing coal-fired plant or perhaps in favor of a gas-fired plant, depending on the ultimate dispatch cost competition).

It is important to note that our model does not evaluate or determine the adequacy of alternate transportation systems; it simply assumed that the alternate transportation capacity was available, but the overall transportation cost for the substitute shipments would be higher since the least expensive barge transportation on the Monongahela was no longer available. Although not specifically evaluated in the study, it is likely that the alternate transportation system, if capacity exists at all, would at least be stressed thereby putting upward pressure on prices. Therefore, the results shown might be considered a "conservative" estimate of impacts since the system would have to work harder to supply the electricity demand (and might even fail) if there is a shortage of trucking and rail capacity. It was also beyond the scope to assess the interrelationships between river, rail, and truck transportation and the subsequent non-coal or non-electricity price impacts resulting by the alternate. These "non-studied" areas include, but are certainly not limited to, price impacts to transportation fuel prices, non-coal commodities, traffic density increases, highway safety, and impacts to highway and rail infrastructure.

The Monongahela River lock-and-dam study resulted in the following conclusions:

- Under the liberal assumption of adequate overland transportation alternatives (see notation above), no brownouts or blackouts occurred, but economic impacts were significant.
- Approximately 21 million individuals are affected by the direct impact of the Monongahela-dependent "Plants of Interest" service areas.

- The ripple effect of the impact goes far beyond the Plants of Interest service areas direct impacts, reaching out to a majority of U.S. electricity users, in excess of 200 million people.
- Through "domino" effects of increased transportation costs compounded by electricity dispatch reactions associated with the loss of the Monongahela River waterway traffic, the cost of producing electricity increases almost across the entire United States. Depending on the actions of various public utilities commissions (PUCs) and the potential pass-through of wholesale purchased electricity price increases, modeling indicates the resulting price paid by electricity customers nationwide could increase by as much as $1 billion annually.
- The impacts stated above are single-year impacts that would occur repeatedly for each year the lock-and-dam remained inoperable.
- The impacts noted are only electric price effects resulting from coal river traffic impedance; the impacts do not include other commodities currently transported on the Monongahela River portion of the Ohio River Navigation System (approximately 15% of tonnage in this length of river is petroleum, aggregates, grain, chemicals, ores/minerals, and iron/steel)[3].
- If only one-half of the total 2008 tonnage (21,776,100 tons) barged through the three focus Monongahela River locks were transported by truck (assuming the other half could be shipped by rail), it would equate to an additional 1,500 twenty-ton triaxle trucks every day, or more than 60 trucks an hour, entering the local roads and highways.
- Generally, increased price of electricity causes an increase in production costs for businesses and cost of living for the general population, which

[3] http://outreach.lrh.usace.army.mil/Locks/Mon234/Default.htm.

typically results in a negative impact to economic growth (quantifying these effects were beyond the scope of this study).

It is also interesting to note, in other work by LTI, it has been forecasted that even with sustained low natural gas prices (maintaining less than $4/MMBTU natural gas cost levels for 50 plus years) coal maintains a significant role in electric power generation, industrial and commercial use, and exports with a total coal demand staying above the 1 billion tons per year level for the next 50 years. Based on the combined detailed modeling performed, LTI concludes the Ohio River Navigation System is a vital component to ensuring safe, reliable, low cost, domestic energy – including electricity – to our country.

This concludes my prepared comments. Thank you for the opportunity to present the results of our study and my personal observations. I would be happy to try to answer questions, if you have any, Mr. Chairman.

GREENMONT ENERGY MODEL (GEM®)

Model Overview

The Greenmont Energy Model (GEM®) is an optimization model which calculates the unique combination of a large number of parameters that achieves the lowest cost of electricity generation in the United States for a given amount of electricity demand. The model uses both Linear Programming (LP) and Mixed Integer Programming (MIP) optimization techniques and thus can be characterized as an LP/MIP optimization model. GEM® simultaneously solves 84 time blocks for a single year (six seasons times 14 time zone combinations for time-of-day load distribution). Since all this is done simultaneously, it means that in one single module of computation, optimal co-dependent values are determined for all of the varying parameters including, among others, amount and type of coal choice by unit; level of each unit's dispatch; environmental clean-up decisions between new equipment, fuel switching, allowance purchasing; location, amount and type of new generation capacity; retirement of existing units; amount of economically justified mining capacity expansion for each cost level for each type of coal; fob coal mine prices; wholesale electricity prices; and pollutant allowance prices. The model carries forward results from each previous year so that in a succeeding year the correct amount of (1) generation capacity by type, (2) mining capacity and remaining reserves by type and cost level, and (3) clean-up capacity for each pollutant are available. All of the varying parameters are output by the model in database tables, and many of the key outputs are aggregated upward to regional and national totals that are automatically graphed across years.

The GEM® model minimizes total system cost of U.S. electricity production and distribution. The demand zones or areas, together with load curves, are given and connected via a transmission network. Power plants supply energy into this network. A power plant is assigned to a particular demand area, based on its location. For power plants not fired by coal or gas, a simplified generation cost and emission rate is applied. For gas fired plants, the generation cost is taken off a gas supply curve based on elasticity assumptions.

Coal-fired power plants that play an import role in today's energy system are modeled at a detailed level. The GEM® Model is the only major energy model that optimizes at the boiler level, as opposed to solving at a higher grouping level and then back-allocating the solution to individual real-world boilers. Every boiler of every coal-fired power plant in the United States is represented separately in the GEM® model. Pollution abatement technology plays a major role in the GEM® model. Coal-fired power plants can invest or use already installed abatement technology capacity to reduce the emission rates for all major pollutants. In addition, they can buy emission allowances from other emitters (if permitted in the scenario setup). The coal-fired power plants also have complete freedom of choice in the quality of coal to use. All coals are available to every coal-fired unit (except for coals that would be technically infeasible to burn in the unit). The delivered cost of coal is determined for each plant by a coal price that is drawn from the marginal point of production on a set of detailed mine cost supply curves and by a transportation cost estimate. Additional cost modules of the GEM® model are:

- cost of wheeling of power
- cost for constructing a new plant of a certain type
- generation cost
- cost for construction of new mining capacity (for each type of coal)

In addition to generating power with existing power plant capacity, the model can also build new or extend existing power plants and increase coal mining capacity to satisfy growing energy demand. However, new capacity of either type must meet economic criteria, which are inputs to the model before it can be built. If the economic criteria are not met, then the additional capacity is not built, and energy commodity prices keep rising until the economics favor building new capacity. No other energy model allows so many variables to freely float in a simultaneous solution (instead of looping back and forth between separate models or modules) to achieve a fully integrated solution with all variables being instantaneously dependent on each other and reaching economic market equilibrium at the same time.

The GEM® model also solves the classic problem of needing to continually re-estimate individual coal transportation costs from coal source to the electric plant. It does this with an innovative network approach that dynamically determines coal transportation cost. Thus, the problem of using transportation estimates that are sometimes several years old is alleviated since the model refreshes its transportation costs via the innovative network.

Typical Inputs

- Electricity demand by generation area
- Bidirectional transmission capabilities between generation areas
- Gas basis differential from the Henry Hub
- A gas price-elasticity curve based on Henry Hub prices
- Proprietary coal specific mine cost curves
- Coal Transportation Costing Module determining costs via network algorithms which allow all coals to be bid into all plants simultaneously and also allow quick and easy updating of transport mils/ton-mile rates
- Coal fired boiler level data
- All non-coal electric generating plants' data, included for both the U.S. and Canada
- User-determined discounted cash flow Internal Rate of Return (IRR) input as a minimum criterion for coal mine and electric plant new capacity additions
- Capital and Operating Cost assumptions for new generation by plant type (CC, GT, PC, IGCC, Nuclear and Renewables – Based on Wind Power costs)
- Multi-pollutant allowance trading capability for any number of pollutants and/or trading region
- NO_x SIP call, CAIR, CAMR (or the new Transport Rule plus Mercury MACT) and CO_2 restrictions at annual and strict ozone season levels (i.e. SO_2, NOx, Mercury and CO_2 limits by region, by year and/or by season)
- Coal plant turn down rate at unit level
- Capital and Operating Cost of Clean-up Equipment
- Current and announced clean-up equipment installations at existing plants for all pollutants
- 104 modeled coal types reflecting both Domestic and International coals plus the ability to co-fire natural gas in each coal-fired boiler
- 123 modeled Generation Areas
- Specific mine capacity, cash mining cost estimate, reserves and expandability

Typical Outputs

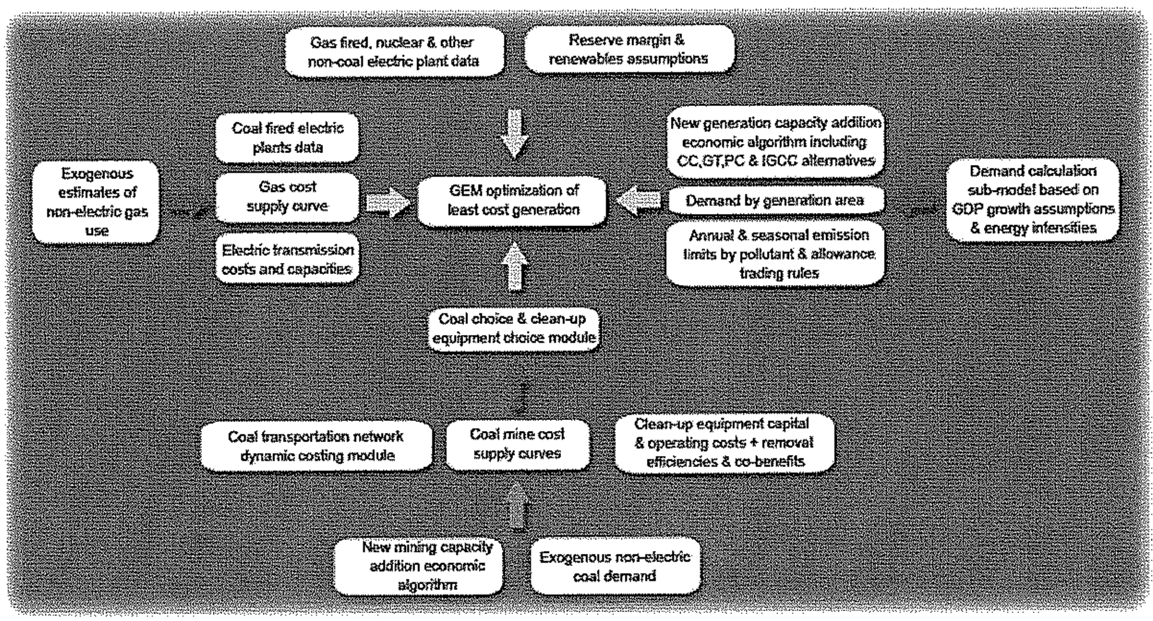
- Dispatch curves by generation area from unit level costs, by year
- Electricity generation by coal-fired unit and by plant for all U.S. and Canadian plants by year
- Electricity wholesale prices by time of day, season and generation area

- Projected annual new generation capacity by plant type and location
- Projected FOB Mine Coal Prices by specific coal and year
- Projected coal production by specific coal and year

- Coal choices by unit by year

- Projected gas prices and volume used for electric generation
- Projected SO_2, NO_x, Hg, CO_2 allowances priced by year
- Optimized clean-up equipment installations by unit and year of installation
- Generation capacity using each type of clean-up equipment by year

GEM® Components



Robert C. Dolence, P.E.

SUMMARY OF QUALIFICATIONS

- Over 30 years of technical, managerial and business experience in the energy and environmental areas.
- Diverse experience developing and implementing programs, managing private sector companies, state and federal regulatory roles in developing and implementing government policy.
- Proven executive and management skills; extensive experience in the energy sector, including production, regulation, technology, and policy.
- A recognized professional on both the public and private energy sectors with demonstrated skills in the areas of organizational management, development of managerial cost controls, strategic planning, business development and managerial and financial management accounting systems (cash and accrual).

PROFESSIONAL EXPERIENCE

Vice-President **2003 – Present**
Leonardo Technologies, Inc. (LTI)

- As an LTI executive manager, provide task management, general management, business development, technical direction and expertise on energy and environmental activities.
- Provide technical and management support to federal agencies and private companies in the energy production, energy technology and environmental compliance arenas.
- LTI's primary point of contact for the U.S. Department of Energy's National Energy Technology Laboratory (NETL), a federal technology research and development (R&D) facility.
- Capture and proposal manager in LTI's successful bid for multi-year NETL Program and Performance Management (PPM) site support contract at NETL valued at $19 million per year.
- Transition Manger and subsequent Program Manager for the NETL PPM cost plus award fee contract. Responsible for all aspects of support by 100+ LTI and subcontract personnel in Energy Efficiency, Renewable Energy, and Fossil Energy program areas.

Vice President for Program Management **2001 – 2003**
Science Applications International Corporation (SAIC)

- Primarily supported the U.S. Department of Energy's National Energy Technology Laboratory in national energy policy areas, technology R&D in energy and environmental areas.
- Responsible for an 80 person division including $10 million per year P&L center within this employee owned company with 41,000 employees working in the areas of IT, energy, communications and homeland security.
- Consulting roles included technology development, program management, strategic planning, regulatory compliance, regulatory compliance and permitting of facilities.

***Deputy Secretary for Mineral Resources Management (MRM)*, 1995 – 2001**
Pennsylvania Department of Environmental Protection (DEP)

- Senior executive responsible for developing and implementing Pennsylvania's policies and programs regulating oil and natural gas production, coal and industrial mineral extraction, mine safety and abandoned mine reclamation.
- Integral in the development and initial implementation of DEP's Growing Greener and Reclaim Pennsylvania initiatives; completed MRM Regulatory Basics Initiatives involving industry, public and regulators in evaluation of all MRM regulations and policies.
- Reporting to the Cabinet Secretary, was in charge and responsible for five bureaus with a total of 580 professionals; included program and fiduciary responsibilities, developed and participated in public outreach, interfaced with industry and the Pennsylvania Legislature, testified before PA Legislative Committees and U.S. Congressional Committees.

OTHER EXPERIENCE

***Owner and Principal* 2003-present**
Dolence Consulting, LLC (consultant in energy and environmental areas, includes part time ad hoc work with BioMost, Inc. (mine reclamation firm))

***Program Manager, Federal Energy Technology Center* 1990 – 1995**
U.S. Department of Energy (federal energy research and development facility)

***Engineer Supervisor and Program Manager, Office of Surface Mining* 1988 – 1990**
U.S. Department of the Interior (federal regulatory agency)

***Engineer* 1982 – 1988**
Kocher Coal Company (coal producer)

***Staff Engineer* 1981 – 1982**
Eavenson, Auchmuty & Greenwald (engineering consulting firm)

EDUCATION

B.S. Engineering, Cum Laude, University of Pittsburgh
M.B.A. Katz Graduate School of Business, Gamma Sigma

OTHER

Registered Professional Engineer (PA)
Licensed Blaster (PA)
Director for Stream Restorations, Inc. (2006-Present)
Director for Montour Run Watershed Association (2002-Present)
Member of the Advisory Board for Washington & Jefferson College's Center for Energy Policy and Management (2011-Present)
Director for Pittsburgh Section Society of Mining Engineers (2001-2005)
Director for Penn Anthracite Section of Mining Engineers (1983–1988)

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

Truth in Testimony Disclosure

Pursuant to clause 2(g)(5) of House Rule XI, in the case of a witness appearing in a nongovernmental capacity, a written statement of proposed testimony shall include: (1) a curriculum vitae; and (2) a disclosure of the amount and source (by agency and program) of each Federal grant (or subgrant thereof) or contract (or subcontract thereof) received during the current fiscal year or either of the two previous fiscal years by the witness or by an entity represented by the witness. Such statements, with appropriate redaction to protect the privacy of the witness, shall be made publicly available in electronic form not later than one day after the witness appears.

(1) Name:
ROBERT C. DOLENCE

(2) Other than yourself, name of entity you are representing:
LEONARDO TECHNOLOGIES, INC.

(3) Are you testifying on behalf of an entity other than a Government (federal, state, local) entity?

YES (circled) — If yes, please provide the information requested below and attach your curriculum vitae.
INFORMATION IS ATTACHED

NO

(4) Please list the amount and source (by agency and program) of each Federal grant (or subgrant thereof) or contract (or subcontract thereof) received during the current fiscal year or either of the two previous fiscal years by you or by the entity you are representing:

INFORMATION IS ATTACHED

Robert C. Dolence
Signature

4-12-2012
Date

Leonardo Technologies, Inc.

Contracts during the Fiscal Years of 2010, 2011, and 2012

U.S. Army Corps of Engineers
Contract # W91237-08-C-0010
Period of Performance (POP): September 4, 2007 – September 30, 2012
Contract Value:[1] $1,199,897.91

U.S. Department of Energy
Contract # GS23F0231R/DE-DT0002770
POP: June 27, 2011 – June 26, 2013
Contract Value: $3,143,778

U.S. Department of Energy – Office of Clean Energy Systems
Contract #GS23F0231R/DE-DT0002770
POP: September 30, 2007 – May 31, 2011
Contract Value: $5,235,642

U.S. Department of Energy – Office of Clean Coal
Contract #GS23F-0136P/DE-DT0000197/023[2]
POP: November 1, 2008 – October 31, 2013
Contract Value: $19,235,642

U.S. Department of Energy – National Energy Technology Laboratory
Contract #2009-SC-RES-30033-010[3]
POP: April 16, 2010 – November 14, 2013
Subcontract Value: $500,000

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[1] Contract Value is the total value that can be accommodated under the contract for the stated Period of Performance (POP). The amount shown does not indicate the costs incurred and/or invoiced and may include amounts prior to the FY 2010, 2011, and 2012 times requested.

[2] Work under GS23F-0136P/DE-DT0000197/023 was/is performed as a teaming partner with IBM

[3] Work under 2009-SC-RES-30033-010 was/is performed by LTI as a subcontractor to URS.

U.S. Department of Energy – National Energy Technology Laboratory
Contract #41817M1911[4]
POP: June 15, 2009 – January 14, 2010
Subcontract Value: $117,810.83

U.S. Department of Energy – National Energy Technology Laboratory
Contract #FE0004002
POP: November 16, 2009 – November 15, 2014
Contract Value: $95,000,000

U.S. Department of Energy – National Energy Technology Laboratory
Contract #GS-23F-0231R/AD2607NT43210
POP: May 22, 2007 – May 21, 2010
Contract Value: $2,460,826

U.S. Department of Energy – National Energy Technology Laboratory
Contract #GS-23F-0231R/DE-08NT0002634
POP: July 1, 2008 – June 30, 2011
Contract Value: $4,299,503

U.S. Department of Defense – Construction Engineering Research Laboratory
Contract # W9132T-09-C-0027
POP: April 16, 2009 – March 31, 2010
Contract Value: $307,000

U.S. Department of Defense – Construction Engineering Research Laboratory
Contract # W9132T-05-C-0027
POP: September 16, 2009 – May 16, 2010
Contract Value: $908,187

[4] Work under #41817M1911 was performed by LTI as a subcontractor to RDS (Research and Development Services, LLC).