



## ***Rocks to Reactors: Past, Present, and Future of the Coles Hill Uranium Deposit***

**May 2, 2012**



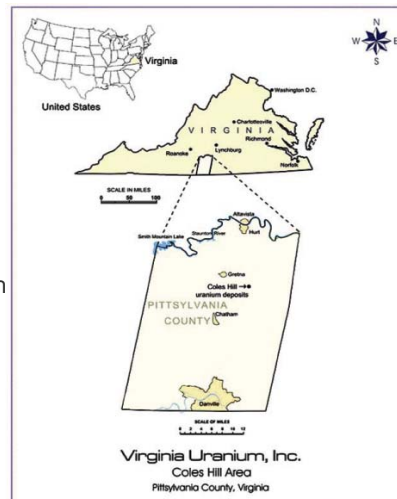
**Fuel for America  
Jobs for Southside**



Fuel for America

### **Coles Hill Uranium Deposit Location – Pittsylvania County, Virginia**

- Discovered in 1978
- Of Undeveloped Resources
  - Largest uranium resource in US
  - 7<sup>th</sup> largest in the world
- Mining Regulated by States
- Milling and Tailings Regulated by Federal NRC
- What is Uranium?
  - Heaviest naturally occurring element
  - One of the most common elements on earth
    - Average Seawater ~ 2-4ppb U
    - Average Granite ~ 2-4ppm U
    - Average Coles Hill Ore ~ 600ppm U
    - Average backyard has ½ lb of U
  - Primary fuel for nuclear power plants
- Safer to transport than common fuels



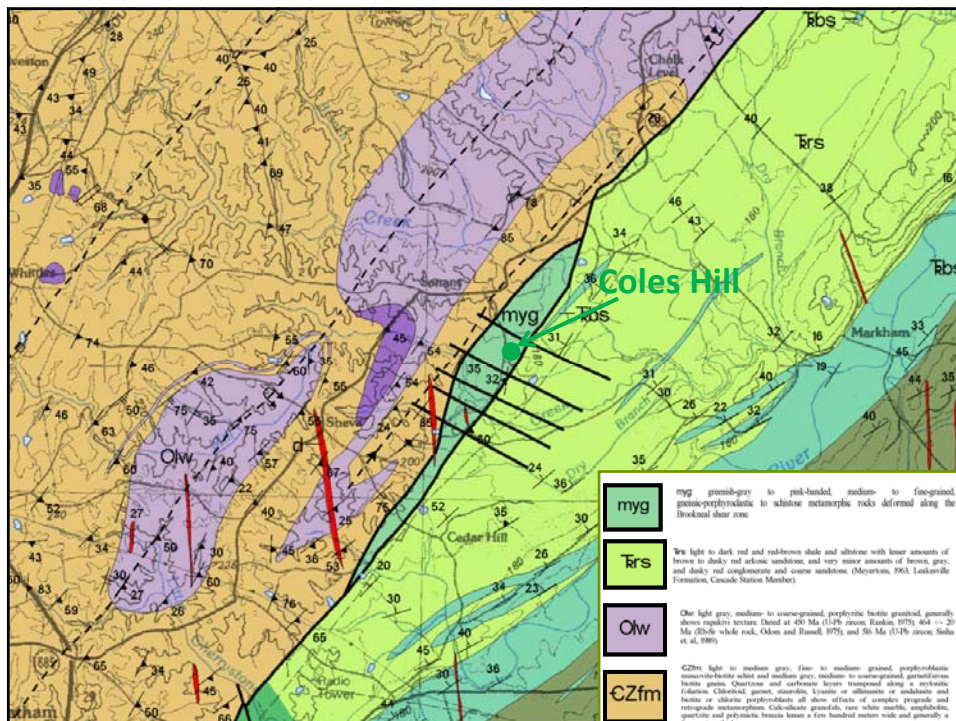
## Virginia's Nuclear Heritage

- Dominion (North Anna & Surry)
  - 4 Nuclear Reactors
  - Nuclear provides 36.3% of Virginia's electricity
- Babcock & Wilcox (Lynchburg)
  - Military fuel fabrication
  - IST mPower reactor facility, Bedford VA
- AREVA (Lynchburg)
  - Reactor design and maintenance
- Naval Nuclear Fleet in Norfolk
  - Construction and stationed
- Nuclear Engineering Curriculum
  - Virginia Commonwealth, Virginia Tech
- **All need FUEL = Virginia Uranium**
  - **119 million lbs of Resources**



## Virginia's Mining Heritage

- Colonist began mining in 1609
- First US Coal mine in Richmond 1748
- 400 different minerals found and
  - 30+ different minerals produced in Virginia
  - Annual value of nearly \$2 billion
- **10th largest producer of coal**
- **5th largest producer of crushed stone**
- Home to many prominent mining companies
  - Alpha Natural, Luck Stone
- One of four companies to manufacture 400 ton mining trucks
  - Liebherr, Newport News
- Virginia Tech Mining Engineering & Geosciences





**Coles Hill Airborne  
Radiometric Response  
from a  
Scintillometer**





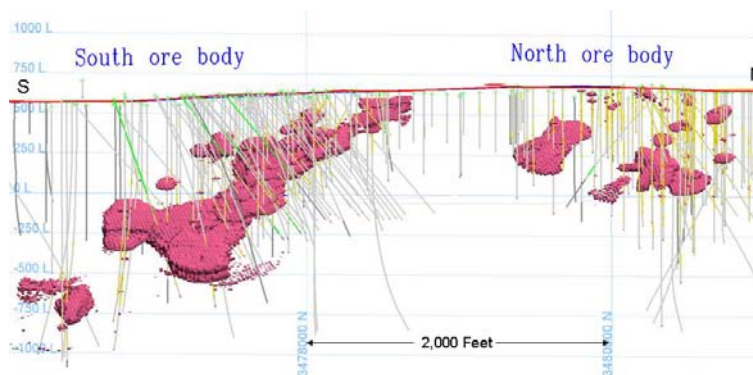
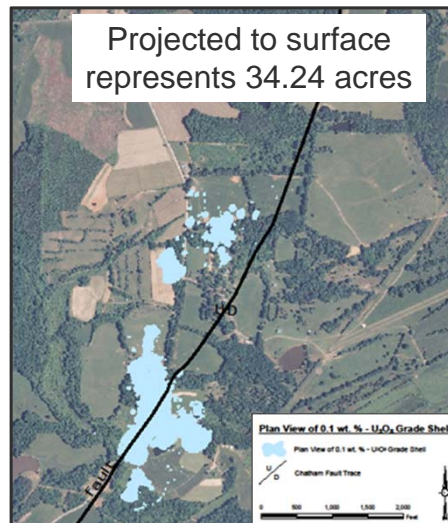
## Defining the Deposits

### Historical

- Marline and Union Carbide drilled 210 holes to define the deposits
- 153 rotary percussion; 57 diamond drill holes
  - 65,082 ft of core
  - 124,799 ft of rotary percussion
- Project advanced to feasibility stage
- \$43 million in expenditures (1982 dollars)

### What VUI has done

- Received DMME exploration permit (# 90484-EX) November 27, 2007
  - Permit for 40 holes, Drilled 10 holes
    - 3 core holes
    - 2 new rotary percussion holes
    - 5 reconfirmed holes
- 4,510 ft of new core
- 9,137 ft of new rotary percussion
- Canadian National Instrument (NI) 43-101 Resource Estimate, completed April, 2009

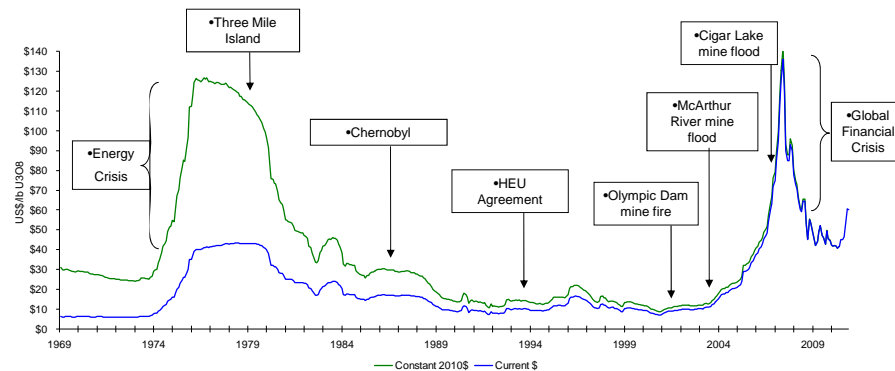


Vertical Cross-Section of Coles Hill Deposits, Looking West  
(0.1 wt%  $U_3O_8$ )

## • Compelling Supply and Demand Fundamentals (cont.)

- Due to the current global supply and demand fundamentals, uranium is expected to enter another period of increasing prices

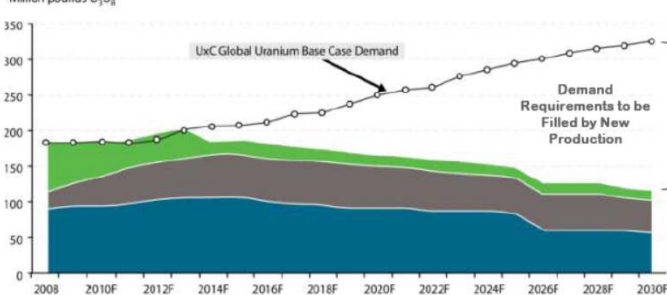
### • Historical Uranium Prices (1969-Present)



## Global Demand for Uranium Set for Significant Growth

- The World Nuclear Association (WNA) tally of nuclear reactors is increasing every year (as of 10/2011)
  - 432 reactors currently in operation in 30 countries
    - Supply 15% of the world's power
  - 63 new reactors currently under construction (vs. 36 in Aug 2008)
  - 152 reactors on order or planning stages (vs. 93 in Aug 2008)
  - 350 new reactors at the proposal stage (vs. 219 in Aug 2008)

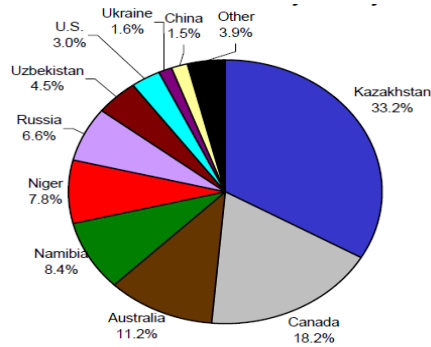
Production from Existing Mines and Secondary Supply



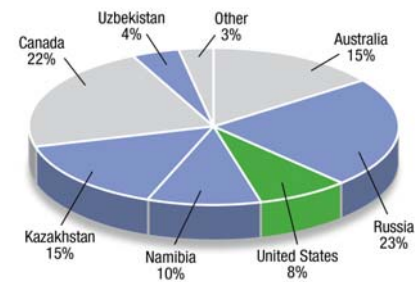
• Source: <http://a>

• Existing production excl. Kazakhstan • Kazakhstan • Secondary Supplies

## World Uranium Producers

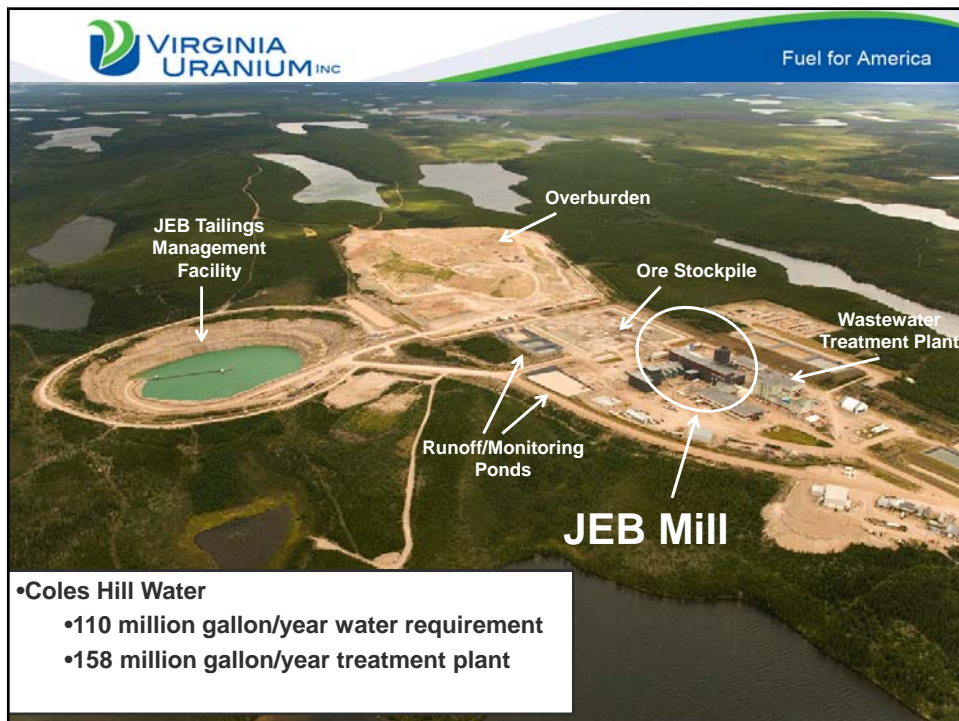


## US Uranium Suppliers



Source: U.S. Energy Information Administration (2010)

- From 1950 -1983 the US was the largest producer of uranium
- The US is currently the largest importer of uranium

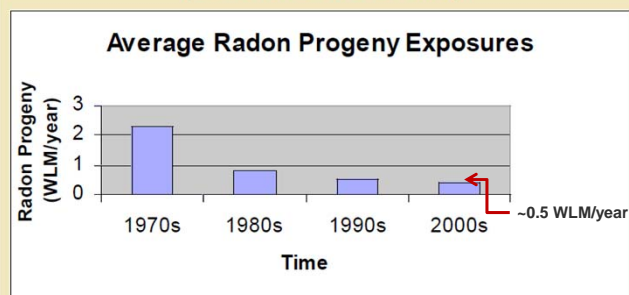


- Coles Hill Water
  - 110 million gallon/year water requirement
  - 158 million gallon/year treatment plant

### •Industry Exceeding Regulatory Requirements

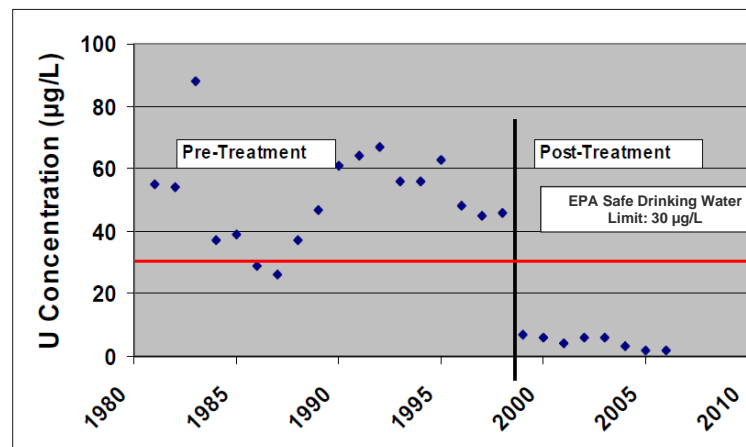
- 1990's EPA survey found the average concentration of radon in VA homes was 2.7 pCi/L (p. 121)
  - 1 pCi/L radon = 0.26 WLM/year
  - 2.7 pCi/L radon = 0.702 WLM/year > 0.5 WLM/year
- Therefore: Modern uranium mine workers are exposed to less radon than the average Virginian in their home

### Modern WLM Exposures (Saskatchewan)



### Results of Key Lake Reverse Osmosis Water Treatment

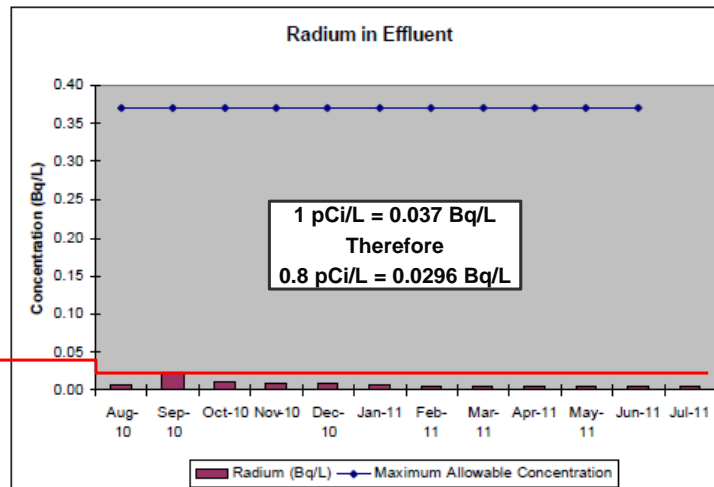
Figure 1. Dewatering water mean annual uranium concentrations ( $\mu\text{g/L}$ ).



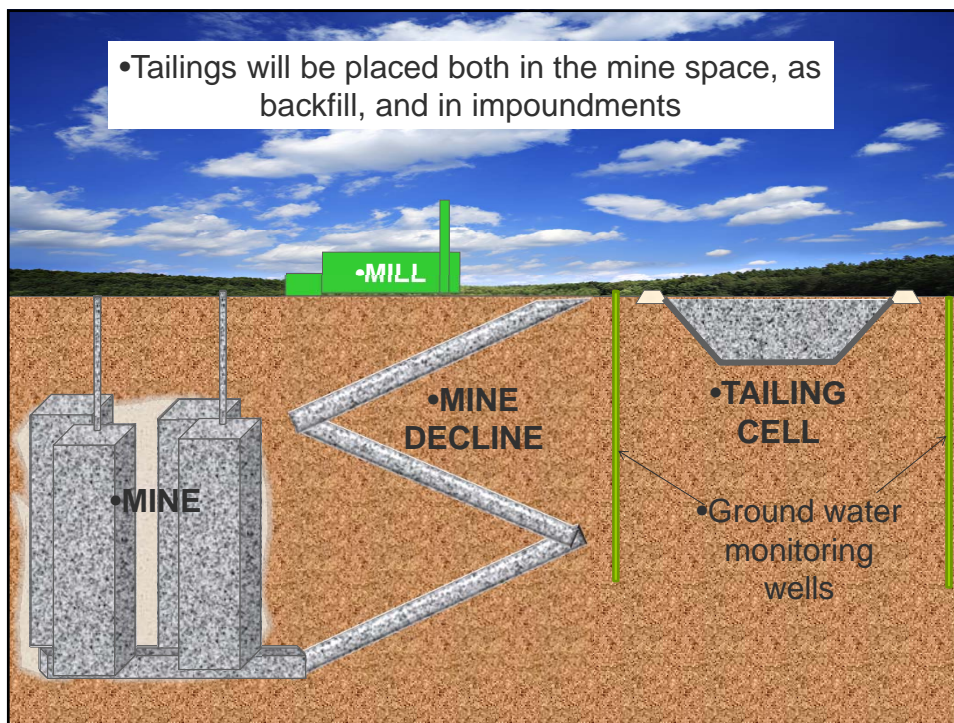


## McClean Lake Effluent Discharge

Radium level  
in Va. Beach  
drinking  
water today:  
0.0296 Bq/L



- Tailings will be placed both in the mine space, as backfill, and in impoundments





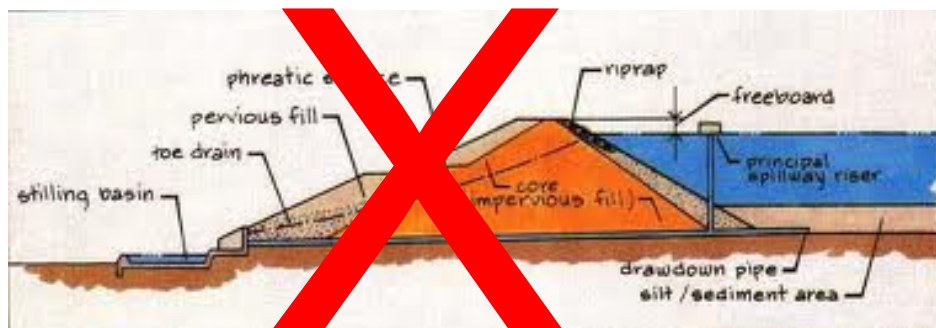
*"over the past few decades, improvements have been made to tailings management systems to isolate tailings from the environment, and below-grade disposal practices have been developed specifically to address concerns regarding tailings dam failures. Modern tailings management sites are designed so that tailings remain segregated from the water cycle to control mobility of metals and radioactive contaminants for at least 200 years, and possibly up to 1,000 years." (NAS Report, p. 15)*

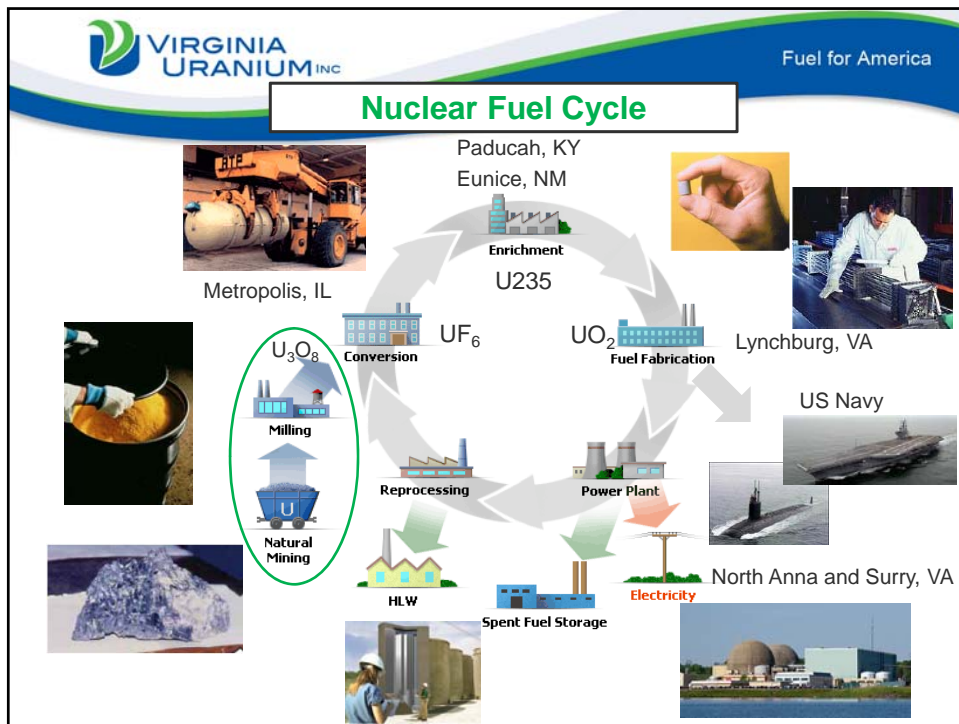


Fuel for America

**10 CFR Part 40 Appendix A:**

**Criterion 3**—The "prime option" for disposal of tailings is placement below grade





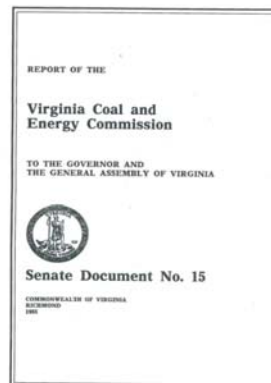
**VIRGINIA URANIUM INC.** Fuel for America

### Uranium Mining Moratorium

- Per Virginia Code §45.1-274, Uranium exploration is permitted
- Per Virginia Code § 45.1-283 (1982)  
*“Notwithstanding any other provision of law, permit applications for uranium mining shall not be accepted by any agency of the Commonwealth prior to July 1, 1984, and until a program for permitting uranium mining is established by statute.”*

## Virginia's Uranium Studies

- 1981: Virginia General Assembly approved House Joint Resolution No. 324 Requesting Virginia Coal & Energy Commission ("CEC") to evaluate uranium
- 1983: Uranium Administrative Group ("UAG") established in SB-155 that finds that a preliminary study  
*"...has not identified any environmental or public health concern that could preclude uranium development in Virginia."*
- 1984: Recommendation by 16 of 18 (89%) UAG members *"We conclude that the moratorium on uranium development can be lifted..."*
- 2008: CEC creates uranium mining sub-committee to evaluate uranium development again
- 2010: CEC engaged National Academy of Sciences ("NAS") for evaluation study
- 2011: NAS Study Released



## State-sponsored socio-economic study

### • Highlights:

- Construction Phase
  - 3 years
  - 323 jobs per year
  - \$35 million per year net economic impact
  - \$2.5 million per year state and local taxes
- Operational Phase
  - 1,052 jobs (direct, indirect, induced)
  - \$135 million per year net economic benefits
  - State and local taxes
    - County: \$1.1 million per year
    - County: \$3.6 million per year in new severance tax
    - State: \$2.0 million per year
  - \$5 billion in revenue for Virginia firms (over life of project)



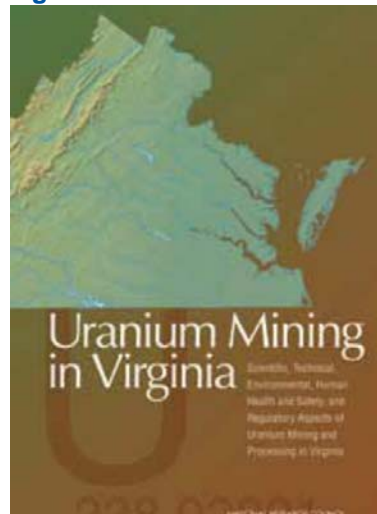
*"In the opinion of Chmura, the mining and milling operations would bring substantial and much needed economic benefits to Pittsylvania County, the immediately surrounding areas, and the state."*

**The Socioeconomic Impact of Uranium Mining and Milling in the Chatham Labor Shed, Virginia**

## National Academy of Sciences Uranium Mining in Virginia

### •Key Findings:

- Provides clear "Road Map" on how Virginia could proceed with developing regulations
- Industry Best Practices can mitigate majority of environmental concerns (p. 15)
- Modern tailings disposal cells have been effective at isolating tailings from environment (p. 15)
- With U ore grades in VA, many technical aspects of mining U would be essentially the same as other hard rock mining operations (p101)
- Coles Hill has low risk of Acid Mine Drainage (p. 147)
- Coles Hill is only economically viable deposit in Virginia** (p. 78)
- Many impacts discussed were from mining facilities that operated at standards of practice that are generally not acceptable today (p. 104)
- Reasonable timeframe (5-8 years) before mining would begin (p. 212)



## Action by Governor Robert F. McDonnell January 19, 2012

### •Executive Directive

- Establish: Uranium Working Group
  - Department of Mines, Minerals and Energy
  - Department of Environmental Quality
  - Department of Health
- Charged with: Establishing draft statutory and conceptual regulatory framework
- Comprehensive 18 point directive
  - Work with NRC to determine necessary standards
  - Define parameters of EIS process
- Report findings periodically to public and legislature
- Complete work by December 1, 2012
- Allows draft regulations to be developed over next 11 months
- Draft regulations could be considered during 2013 Legislative Session



[humanevents.com/article.php?id=43536](http://humanevents.com/article.php?id=43536)





## **Uranium Resources in Virginia World-Class Deposit**

[www.VirginiaUranium.com](http://www.VirginiaUranium.com)

**Fuel for America**