

**Development of the Coles Hill Uranium Deposit  
with Sustainability as a Cornerstone – 9441**

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**ABSTRACT**

Uranium mining has not been very active in much of the world for the past 30 years. With the nuclear renaissance, the uranium mining industry has undergone a renaissance as well. There are a handful of uranium mining companies that have been operating since the last uranium boom that are taking forward thinking approaches and retrofitting their businesses to approach mining in a more sustainable manner. However, with the nuclear renaissance, there are hundreds of juniors in the mix that are ripe for implementing sustainable practices in their operations from the beginning.

The Coles Hill uranium deposit site in Pittsylvania County is on land that has been owned by the families living there for generations (some as far back as the 1780s). Virginia Uranium Inc. (VUI) owns the Coles Hill uranium deposit. Concern for the community's progress and respect for the environment are deeply ingrained in VUI values. VUI's business decisions are guided by their core values which are expressed in seven guiding principles. This paper will present an initial approach to sustainability that is incorporated into a company's operations from its inception, an approach that is the only option from the perspective of the owners of VUI.

**INTRODUCTION**

The Coles Hill uranium deposit in Pittsylvania County, Virginia, is characterized by uraninite, coffinite and pitchblende mineralization in a crystalline host rock of the Piedmont geologic province. The deposit is estimated to be the largest uranium deposit in the United States, containing more than 110 million pounds of U<sub>3</sub>O<sub>8</sub>. Initially discovered in 1979, Marline Uranium/Oil and Union Carbide carried out an exploration - development program which included drilling and sampling over 200 rotary percussion and core holes. Over forty-three million dollars were spent on exploration and definition of the Coles Hill ore body in the early 1980's, making it one of the most well defined undeveloped uranium deposits in the world. Operations ceased in 1983 with the decline of uranium market values.

As uranium prices began to increase in 2004, uranium mining companies from around the world were eager to acquire proven uranium deposits. As a result of the extensive exploration of the Coles Hill ore body performed in the early 1980's, the deposit was considered one of the "mega-deposits" that was yet to be developed. Uranium mining companies came from around the world to Pittsylvania County, Virginia, with considerable compensation, in hopes that they might acquire leases on the Coles Hill ore body. After considering all of the very generous offers the families that controlled the land, on which the deposit is located, decided that they would not accept any offers from outside companies. Instead, they decided that if the deposit was to ever be developed that it would be done by a local company, with local employees, where the economic benefits would largely stay in the localities surrounding the deposit.

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Hence, Virginia Uranium, Inc. (VUI) was born. From its very conception, VUI and the sustainability of the surrounding area were irrevocably intertwined. This paper describes challenges facing VUI's efforts to begin work on the only U.S. East coast uranium mine and how VUI will mitigate those challenges with an operational philosophy that embraces sustainability.

## **COLES HILL PROJECT CHALLENGES**

All uranium mining projects in the United States face complex, extensive, and costly regulatory and permitting requirements designed to protect human health and the environment from operational and waste management aspects of uranium mining. The Nuclear Regulatory Commission's (NRC) "risk-informed, performance-based, non-prescriptive" approach governs the regulatory regime for uranium processing. State mining authorities and state departments of environmental quality, as they implement federal environmental protection standards, regulate uranium mining. Uranium mining is subject to more than three dozen federal environmental laws and regulations (depending on land ownership) including:

- Surface Resources Act at 43 CFR, Subpart 3715
- Federal Mining Regulation at 43 CFR, Subpart 3809, Surface Management
- Federal Land Policy and Management Act
- Clean Air Act
- Federal Water Pollution Control Act (Clean Water Act)
- Solid Waste Disposal Act
- Comprehensive Environmental Response, Compensation, and Liability
- Endangered Species
- Migratory Bird Treaty Act
- Rivers and Harbors Act
- Mining Law of 1872
- National Historic Preservation Act
- Law Authorizing Treasury's Bureau of Alcohol, Tobacco and Firearms to Regulate Sale, Transport and Storage of Explosives
- Federal Mine Safety and Health Act

In addition to NRC governed permitting and federal law, VUI faces challenges unique to its location and community; these include (1) the Commonwealth of Virginia's moratorium on uranium mining, (2) opposition groups, and (3) lack of uranium mining experience in Virginia.

### **Virginia's Moratorium on Uranium Mining**

Pursuant to the Marline uranium discovery, the 1981 Virginia General Assembly directed the Virginia Coal and Energy Commission (CEC) to undertake a study of the issue of uranium development in the Commonwealth, and specifically in Pittsylvania County, Virginia. The CEC commenced its study in April 1981, and created a Uranium Subcommittee in late summer of 1981.

The Uranium Subcommittee recommended in 1982 that Virginia adopt a statute that would regulate exploration for uranium ore. The recommendation was adopted through passage of Virginia Senate Bill 179. This Senate Bill also prohibited any Virginia agency from accepting permit applications for uranium mining before July 1, 1983, or until a program for permitting uranium mining is established by statute, otherwise known as a moratorium.

Following the Uranium Subcommittee recommendations, in 1983 Senate Bill 155 (SB 155) established the Uranium Administration Group (UAG), charged with examination of uranium development "at

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specific sites in Pittsylvania County.” After extensive studies and discussion the UAG made the following recommendation in 1985: “Based on all these efforts, we can now conclude that the moratorium on uranium development can be lifted if essential specific recommendations derived from the work of the task force are enacted into law.” Sixteen members of the UAG supported the recommendation with two dissents.

Uranium mining regulations were never finalized by the UAG, as the downturn in prices made uranium development uneconomic. Therefore, the moratorium was not lifted because specific legislation was not introduced to do such. The moratorium remains in place today (2009), even though its intent was not to ban uranium mining, but rather allow time for the proper development of regulations.

In September 2007, the executive branch of the state government published the Virginia Energy Plan, which provided a comprehensive analysis for how the State might become more energy independent. The report highlighted that approximately 35 percent of the electricity generation in Virginia comes from nuclear power plants. All the nuclear fuel (uranium) used in Virginia is currently imported into the State. Due to the presence of substantial uranium resources in Southside Virginia the report recommended that serious consideration be given to the development of a local uranium mining initiative. The following quote from the Virginia Energy Plan refer to the Coles Hill uranium deposit in Pittsylvania County:

*“There are sufficient resources to support a uranium mining industry in Pittsylvania County with enough to meet the fuel needs of Virginia's current generation... Virginia should assess the potential value of and regulatory needs for uranium production in Pittsylvania County.”*

During the 2008 General Assembly in Virginia, VUI supported legislation that would have established a legislative committee to study uranium development in the State that followed the recommendations of the Virginia Energy Plan. While the Virginia Senate approved a uranium study bill by a vote of 36-4, the legislation was subsequently tabled during a hearing of the Rules Committee in the Virginia House of Delegates.

In November 2008, the Virginia Coal and Energy Commission (CEC) passed a motion to appoint a sub-committee of its members to oversee a study of the impact of uranium mining in Virginia. The CEC sub-committee held two public hearings to solicit input on the scope-of-study. The Virginia Center for Coal and Energy Research at Virginia Polytechnic and State University will likely be asked by the CEC to negotiate the scope-of-work with an entity such as the National Academy of Sciences (NAS). The NAS, or similar institution would perform the study on uranium mining in Virginia. The moratorium on uranium mining in Virginia will remain in place until the Virginia Legislature acts to remove it and implement uranium mining regulations.

### **Opposition Groups**

Local and regional nongovernment organizations (NGOs) and similar stakeholders, including some that generally take positions opposing mining and/or other industrial development, have raised concerns regarding perceived safety or environmental impacts they suggest may be associated with uranium mining. While VUI believes that the positions specifically opposing the Coles Hill project may be rather weakly supported factually or scientifically, the Company shares the NGOs/stakeholders views of being strongly committed to protecting human health and the environment. VUI has met, and will continue to meet with such groups, to seek out ways in which the Company and stakeholders can work together to develop the Coles Hill site in a safe and sustainable manner.

## **Lack of Uranium Mining Experience in Virginia**

Some stakeholders have suggested that a lack of historic uranium mining experience in Virginia or generally in the Eastern United States should support prohibition of the development of the Coles Hill uranium deposit. While, it is true that the majority of U.S. domestic production takes place in more arid western states, uranium is currently and has historically been mined in conditions similar to Virginia in places such as South Texas, France, and Australia. Further, Virginia and surrounding states have tremendous experience with sustainable hard-rock mining of other commodities such as lead, zinc, copper, gold and silver. VUI believes that sustainable mining methods used for the successful recovery of those commodities should be considered when evaluating the viability of a uranium mining and milling industry in Virginia.

## **SUSTAINABILITY AND URANIUM MINING**

Sustainability is an inherently subjective term with meanings open to numerous interpretations. One commonly accepted definition is from the United Nations Bruntland Commission, which defined sustainable development as development that “meets the needs of the present generation without compromising the ability of future generations to meet their own needs.” This is not an operational definition and much discourse has arisen regarding the functional meaning of sustainability. Sustainability initiatives on a practical level are marked by focus on the so-called Triple Bottom Line that, on a corporate level, considers environmental and social performance in addition to financial performance. An important, and often overlooked element of the concept of sustainability, is that sustainability is not an end point, rather it is a process of continual improvement. This process is commonly referred to as the Plan-Do-Check-Act process. When applying the Plan-Do-Check-Act process to sustainable practices, an organization evaluates its operations’ impacts on economic, social and environmental factors, implements projects, programs and procedures to improve performance in these areas, evaluates progress on those measures, and responds to the results of the evaluation. The process repeats itself, resulting in a process of continual improvement.



There are several standards that currently exist that provide guidance at a more detailed level regarding indicators of economic, social, and environmental sustainability. Some of these standards that relate to uranium, mining are described below.

In 2000, the World Business Council on Sustainable Development initiated the Mining, Minerals, and Sustainable Development (MMSD) project – an independent 2-year process of consultation and research aimed at understanding how to maximize the contribution of the mining and minerals sector to sustainable development at the global, national, regional and local levels. MMSD set out to develop practical principles and criteria that could be used to guide or test mining and minerals activities in terms of their compatibility with sustainable development. To this end, MMSD developed the “Seven Questions to Sustainability: How to Assess the Contribution of Mining and Minerals Activities” [2].

The MMSD project led to the creation of the International Council on Mining and Metals (ICMM) to provide leadership for improving the global sustainable development performance of the industry. Representing leading international mining and metals companies, ICMM has issued numerous position papers related to mining’s approach to sustainability, climate change, and related subjects. The ICMM also created a Sustainable Development framework for the mining industry defined by 10 Principles [3].

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The Global Reporting Initiative or GRI is the “gold standard” for corporate sustainability reporting. In 2005 GRI partnered with the ICMM to create a supplement to the GRI reporting guidelines designed for sustainability reporting in the mining industry [4].

### **The International Forum on Sustainable Options for Uranium Production**

In 2007, a number of members of industry, government agencies, and non-governmental organizations (NGOs) realized that, with the nuclear renaissance, development of safer, more sustainable uranium recovery operations would require close coordination between, and discussion among, all of these entities. Accordingly, it was decided that there was a need to develop an International Forum on Sustainable Options for Uranium Production (IFSOU). Through the initial meetings of IFSOU and discussion of IFSOU at conferences such as the National Mining Association/Nuclear Regulatory Commission Uranium Mining Workshop, the uranium mining industry is realizing the increasing importance of taking a new approach to doing business. There are a handful of uranium mining companies that have been operating since the last uranium boom that are taking this forward thinking approaches and retrofitting their businesses to approach mining in a more sustainable manner. However, with the nuclear renaissance, there are hundreds of juniors in the mix that are ripe for implementing sustainable practices in their operations from the beginning. VUI has been involved with IFSOU since its inaugural meeting in March of 2007 and signed on as a secretariat member of IFSOU in 2008. VUI's membership in IFSOU is one indicator of VUI's leadership in the industry and commitment to incorporating sustainability practices in its operations. In addition, VUI hopes to learn from other industry leaders about the most innovative techniques and approaches for incorporating sustainable practices into uranium mining operations. If the moratorium on uranium mining in Virginia is lifted, it is VUI's goal to operate its mine in a safe and environmentally sensitive manner, working closely with and taking into consideration the concerns of the community in which it will operate.

### **VUI SEVEN GUIDING PRINCIPLES**

Integral to VUI are its core values which state that the company; “is dedicated to environmental safety, sound economic development and the well-being of the community and region.” When VUI began its operations, it developed a set of guiding principles to underlie the general core values that would shape the direction of the company. VUI developed the seven guiding principles with the aim of guiding the potential development of the project into more than just mine. VUI's guiding principles include:

1. Energy Independence
2. Community Development
3. Conservation
4. Historic Preservation
5. Preserving Virginia's Agricultural Traditions
6. Regulatory Benchmarks
7. Virginia Stakeholders

While all of the “Seven Guiding Principles” are related to the sustainable development of the Coles Hill uranium deposit, Community Development, Conservation, Historic Preservation and Preserving Virginia's Agricultural Traditions are integral to the development of a comprehensive sustainability plan, and therefore will be the focus of this paper.

## **Community Development**

At prevailing prices, the Coles Hill ore body has the potential to generate billions of dollars of revenue. VUI is dedicated to using this natural resource as an economic development catalyst for all of Southside Virginia. The goal over the coming years of exploration and development is to encourage and involve the community in a variety of entrepreneurial enterprises to enhance the success and quality of life of the region at all levels. To that end, the company has made a concerted effort to employ full time local Virginians and assist local subcontractors with developing the necessary skills to become integrated into the current exploration program.

VUI successfully assembled a capable staff of fourteen individuals with broad ranges of experience that all had ties to, or were already located in, Southern Virginia. Further, VUI was able to assist a local water well drilling contractor with the appropriate equipment and knowledge to tackle the challenge of drilling confirmatory and exploratory bore holes to a depth of 1,500 feet. VUI established a network of technical expertise that allowed this local well driller to complete seven bore holes to a depth that was not previously feasible. This well driller now has the ability to not only drill deeper residential water wells, but provide natural resource exploratory services should they be required in the area in the future.

As a condition of the Virginia Department of Mines Minerals and Energy exploration permit VUI was required to sample surface and groundwater during exploration activities. Local Virginia laboratories did not have the capability to analyze some of the U.S. Environmental Protection Agency (EPA) methods and constituents that were required in the most efficient manner. VUI worked with a local laboratory to determine what methods were required and it was determined that an Inductively Coupled Plasma Mass Spectrometry (ICP-MS) machine would be required to complete the requisite sampling. Due to the sample volume that VUI was requiring the laboratory felt justified in making the capital expenditure for the ICP-MS machine. This laboratory now has the capability to provide ICP-MS services to all of its clients, further diversifying their available services and providing service in a market where there was a void.

Should mining proceed at the Coles Hill site it would mean the addition of 300-500 high paying jobs for a locality that has been decimated by the loss of manufacturing and farming jobs. The jobs would almost exclusively be filled from the local labor force. Employees working in VUI's mine and mill could expect an annual salary between \$65,000-\$70,000. In a locality where the average household income is below \$30,000 a year these wages are not only competitive they are transformative. The resulting positive impact on the local economy would be tremendous.

## **Conservation**

VUI is committed to leaving the land, water, and other natural resources in as good or better condition than they are today. VUI will remediate all areas as required by law and use all efforts to properly place the land in appropriate conservation easements.

Portions of the nearly 3,000 acres currently under VUI's control have already been placed into conservation easements. There are only two other locations in Pittsylvania County, Virginia that currently have land in conservation easements. This is a rather remarkable statistic since Pittsylvania County, Virginia is the largest county, in terms of land mass, in Virginia. Placing land in conservation easements will be a major priority of VUI through all exploration and development activities. Once a mine plan is finalized, any land controlled by the company that will not be used directly in development is planned to be placed into conservation easements in perpetuity. Lease agreements that VUI has with local families mandates that the company return the land to "as close to original contour as reasonably

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achievable". Once the mining and reclamation is complete at the site, all of the land controlled by the company plans to be placed into conservation easements in perpetuity.

Conscientious reclamation of disturbed areas is also of paramount importance to VUI. As a condition of VUI's exploration permit any areas disturbed during drilling were required to be returned to original contour, original background radiometric levels, and be sown with a mixture of native fescue and rye grasses. VUI exceeded these requirements by not only returning the disturbed areas to original contour and background radiometric levels, but also sowing these areas with wildlife food plots. The wildlife food plots included sowing korean lespedeza, switch grass, sunflowers, millet, sudex, and soy beans. These wildlife food plots provide a food source and habitat for deer, turkey, quail, and other native species. Throughout the exploration and development of the Coles Hill deposit, VUI intends to sustainably manage the site to minimize the total number of impacted acres, mitigate those impacts, and ensure that the land is left in better condition than it is today.

### **Historic Preservation**

The land containing the Coles Hill deposit has been in the same family since the 1780's. The house that sits between the two surface expressions of the ore body was constructed in early 1800. With those things in mind, VUI is committed to preserving the historic significance of surrounding structures. To that end the company has agreed to place 600 acres surrounding the Coles Hill manor house into a "protected area". Within this "protected area" the company is not authorized to perform any surface disturbance. However, VUI does have the right to responsibly perform underground mining within this "protected area" if feasible. While the presence of the "protected area" may not be the most profitable approach for VUI, the importance of preserving the historic structures on the surrounding property far outweighs the bottom line impact.

### **Preserving Virginias Agriculture Traditions**

VUI is committed to blending exploration and development activities with the existing agriculture to continue the environmental harmony that currently exists in the community. Since 1785 the land above and surrounding the Coles Hill deposit has been used for agricultural purposes. The long history of agriculture remains today. Even as exploration work continues, farming practices take place in harmony with the geologic research. Over 300 head of cattle and the associated harvest of grain, take place in close proximity to drilling operations. VUI has put extra measures in place to ensure that cattle have restricted access to drill sites, and that they can peacefully coexist with exploration and development activities. Independent of VUI the families that raise cattle have taken measures to ensure sustainable cattle operations. The families have placed riparian buffers around creeks and restrict the cattle from entering the creeks.

Within the conditions of its exploratory permit, VUI agreed that the sumps used to collect water from drilling operations would be lined with 6 millimeter plastic sheets. This allowed all water used or encountered in the drilling process to be captured. The practice of lining sumps with plastic to collect drilling fluids is not considered a uranium industry standard and therefore goes beyond the relative best management practice of the exploration industry.

Before any of the water was released from the sumps it was analyzed based on EPA drinking water standards, for eleven specific constituents. If water met the stringent EPA drinking water standards, as defined in the permit, it was used to irrigate local crops. One would expect that water encountered during uranium exploration may contain levels of certain constituents above EPA drinking water standards, due to the natural concentrations in groundwater. Any water that was above EPA drinking water standards

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was treated with a mobile water treatment system, and the levels were reduced below the EPA standards. Once the treated water was below EPA drinking water standards it was also used to irrigate crops. The additional precautionary and treatment steps that VUI undertook, reduced the impact to the local environment and turned a byproduct of the drilling process into a constructive irrigation source. The commitment that VUI made to processing drilling fluids to EPA drinking water levels far exceeds any current practice undertaken in the management of drilling fluids.

In addition, VUI was required to conduct third-party baseline and routine surface water and groundwater sampling prior to and during exploration drilling. The permit required that fifteen surface water locations be sampled for pH, temperature, and flow rate. In addition, sampling was required at eight surface water and groundwater locations in the direct vicinity of drilling operations. These eight locations were required to be sampled for eleven constituents. VUI took it upon its self to contact surrounding landowners and obtained permission to sample their residential water wells and surface waters.

When the list of sample locations was finalized, over 90 locations were included in the monthly sampling schedule. VUI also increased the number of constituents analyzed from eleven to forty-five. All of the sample results were performed at no charge to the land owners and full disclosure of the analytical report was provided.. A small portion of the analytical reports from the residential water wells indicated that remedial action was required for constituents such as e coli and fecal coliform. The contamination found in these few wells was not in any way related to exploratory drilling operations. The results of the analysis gave land owners information on their residential water wells that they otherwise would not have had. Potential remedial actions were discussed with each land owner that had exceedances.

## **CONCLUSIONS**

VUI is committed to a holistic sustainable approach for the duration of the project at the Coles Hill site. Every decision that the company makes involves the evaluation of how that decision will affect not only the company, but the surrounding community, and the environment. This commitment to sustainable operations is evidenced by minimal steps like a recycling plan all the way to a proposed self-imposed excise tax. VUI hopes to translate any financial success they may have back into the local communities, by placing an excise tax on themselves in the neighborhood of 3 to 4%. This excise tax would be recovered from the annual gross revenue of the company and would be invested directly into initiatives that coincide with the company's "Seven Guiding Principles". Such initiatives could include funding for education, conservation easements, transportation improvements and economic development.

VUI is in perhaps the most unique position of any uranium mining company ever. The reasons for this position are two-fold. First, the structure of the company is unique. The majority ownership of VUI is controlled by the families that own the land on which the deposit is located. Second, the families not only own the land but maintain primary residences on site. The families have all indicated that the mine would need to be designed in such a way that allows them to maintain their primary residences on site during and after mining operations. Few, if any, mining companies have ever been controlled by persons that also own the land and intend to remain on the land during and after operations. Therefore, the company has the greatest stake in ensuring that development is done in a safe and environmentally responsible manner. This gives VUI's management great latitude to incorporate the best management practices and principles of sustainable design into every aspect of development, with a unique understanding of the economic and environmental implications they will have.

Finally, VUI has made a commitment to incorporate sustainability into every aspect of their decision making process. This commitment is not only evidenced by activities that take place at Coles Hill, but also by their involvement and membership in global sustainability initiatives like IFSOUP.



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