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WILL URANIUM GET A GLOWING WELCOME IN VIRGINIA?

*Katherine E. Slaughter*

## ESSAY

### WILL URANIUM GET A GLOWING WELCOME IN VIRGINIA?

*Katherine E. Slaughter\**<sup>†</sup>

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<sup>†</sup> Author's Note: I am grateful for the research assistance of a number of interns from the University of Virginia School of Law: Emily Davis, Class of 2009; Michael Wolin, Class of 2009; Travis Pietila, Class of 2011; and Rianna Barrett, Class of 2011.

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Driving along U.S. Route 29 in "Southside" Virginia near the exit for the town of Chatham in Pittsylvania County, one would not think anything out of the ordinary is happening. As you leave the highway and drive into the outskirts of Chatham on a typical spring day, grasses and mustards are sprouting in the gently sloping fields, dogwood trees, oaks, and maples budding along streams. In the town (population 1,338), signs indicate the location of two private boarding schools, Chatham Hall for Girls, a manor sitting amid 362 carefully tended acres serving 135 girls, and Hargrave Military Academy, a military preparatory school for 430 students in a small town setting.<sup>1</sup> But sprouting occasionally in town yards and

<sup>1</sup> See The Town of Chatham, Town Information, <http://www.chatham-va.gov/ti-stats.html> (last visited Mar. 24, 2010); The Town of Chatham, Town Education: Chatham Hall, <http://www.chatham-va.gov/ed-ch.html> (last visited Mar. 24, 2010).

country fields are white signs with a circle surrounding the words, "Uranium Mining," crossed out with a thick diagonal red line.

Chatham, the county seat of Pittsylvania County, has based its economy largely on agriculture and also hosts small manufacturing operations, retail businesses, and the two private schools.<sup>2</sup> Pittsylvania County itself has a population of approximately 61,000,<sup>3</sup> with its largest city Danville (population 44,660 in 2008), 16.5 miles south of Chatham, at the Virginia/North Carolina border.<sup>4</sup>

The controversy, which has reached the State Capitol, is whether to allow a private corporation, Virginia Uranium, Inc. (VUI), to mine uranium on a local farm, "Coles Hill," where uranium was discovered thirty years ago. Then, as now, uranium was touted as a potential cash crop to replace the dwindling tobacco economy, formerly king of agriculture in Southside Virginia.

When President Obama endorsed the construction of more nuclear plants in his 2010 State of the Union address, followed by an offer of federal loan guarantees for nuclear reactors, many saw this as a signal for the U.S. to turn aggressively to nuclear energy.<sup>5</sup> With uranium prices rising, other countries also seek to open new mines to meet the demand.<sup>6</sup> VUI says that increasing the domestic production of uranium will not only advance energy security in the U.S. but also benefit the local economy.<sup>7</sup> Pointing to the deep community roots of its founders, the company states it is "fully committed to leaving the land, water and other natural resources in as good or better condition than they are today," and says it will support the county's agricultural base and contribute economically to protect its historic resources; VUI believes a scientific study will

[www.chatham-va.gov/ed-ch.html](http://www.chatham-va.gov/ed-ch.html) (last visited Mar. 24, 2010); The Town of Chatham, Town Education: Hargrave Military Academy <http://www.chatham-va.gov/ed-hma.html> (last visited Mar. 24, 2010).

<sup>2</sup> The Town of Chatham, Town Economy, <http://www.chatham-va.gov/bus.html> (last visited Mar. 24, 2010).

<sup>3</sup> Pittsylvania County CERT Program, [http://www.pittgov.org/cert/CERT%20Web%20Presentation\\_files/frame.htm](http://www.pittgov.org/cert/CERT%20Web%20Presentation_files/frame.htm) (last visited Mar. 24, 2010).

<sup>4</sup> Danville, Virginia, <http://www.city-data.com/city/Danville-Virginia.html> (last visited Mar. 24, 2010).

<sup>5</sup> President Barack Obama, State of the Union Address (Jan. 27, 2010); Dina Cappiello & Matthew Daily, Obama Pushes Nuclear Energy to Boost Climate Bill, ASSOCIATED PRESS, Jan. 31, 2010, available at <http://abcnews.go.com/Business/wireStory?id=9709897>.

<sup>6</sup> World Nuclear Association, World Uranium Mining, <http://www.world-nuclear.org/info/inf23.html> (last visited Mar. 24, 2010).

<sup>7</sup> Virginia Uranium, Inc., Energy Benefits of Uranium, <http://www.virginiauranium.com/energybenefits.php> (last visited Mar. 24, 2010).

prove it can mine and mill safely.<sup>8</sup> Opponents point to the abysmal record of the uranium industry in the U.S. and worldwide, leaving in its wake communities plagued by tainted drinking water, high incidences of cancer and other diseases, and a landscape that is environmentally degraded.<sup>9</sup> Local citizens worry about economic impacts to private and public schools, farms and nearby residences, as well as the negative impacts on other existing businesses and tourism.<sup>10</sup> Communities downstream from the Coles Hill site, including Halifax, Virginia Beach and Norfolk, are concerned about potential impacts on public drinking water.<sup>11</sup>

In this article, I will discuss the history of the uranium controversy in Virginia, including the current moratorium on mining and milling in the Commonwealth, the environmental and health issues related to uranium mining and milling, as well as the bifurcated state-federal regulatory program. In Part I, I will recount the discovery of uranium in Virginia in the 1970s, the subsequent citizen involvement, legislative moratorium, and the evolution of the current VUI proposal. In Part II, I will discuss the potential environmental and health impacts of mining and milling. In Part III, I will outline the state role and federal programs related to mining and milling, including the Uranium Mill Tailings Radiation Control Act, the Clean Water Act, and National Environmental Policy Act. In Part IV, I will address the decommissioning, reclamation and eventual federal or state ownership of uranium mill sites. Finally, in Part V, I will summarize the potential impacts for Virginia and the next steps in the public policy process.

<sup>8</sup> Virginia Uranium, Inc., Community, <http://www.virginiauranium.com/community.php> (last visited Mar. 24, 2010).

<sup>9</sup> See Piedmont Environmental Council, Virginia's Uranium Mining Moratorium, <http://www.pecva.org/anx/index.cfm/1.391.0.0.html/Uranium> (last visited Mar. 24, 2010).

<sup>10</sup> See HALIFAX COUNTY CHAMBER OF COMMERCE, URANIUM STUDY GROUP, COMMUNITY CONCERNS RELATED TO URANIUM MINING IN VIRGINIA 104-31 (2008), available at [http://www.halifaxchamber.net/public/assets/Uranium-Mining/file\\_11.pdf](http://www.halifaxchamber.net/public/assets/Uranium-Mining/file_11.pdf).

<sup>11</sup> See CITY OF VIRGINIA BEACH, POLICY REPORT, URANIUM MINING IN THE ROANOKE RIVER BASIN (2008), available at [http://www.vb.gov.com/file\\_source/dept/putility/Document/Business\\_Division/Uranium\\_Mining/VABeach\\_Uranium\\_Mining\\_Policy\\_Report.pdf](http://www.vb.gov.com/file_source/dept/putility/Document/Business_Division/Uranium_Mining/VABeach_Uranium_Mining_Policy_Report.pdf).

## I. URANIUM EXPLORATION IN VIRGINIA

### A. Discovery of Uranium

Uranium is an unstable element, its atoms changing in a chain that also gives off radioactivity from the nucleus.<sup>12</sup> Naturally occurring uranium has several isotopes, U234, U235, and U238, the most common isotope, which can be converted into plutonium that produces fission in nuclear reactors, and has a half life of 4.468 billion years.<sup>13</sup> Its daughter, Thorium-234, has a much shorter half-life of 24.1 days, and further decays into protactinium-234, with a half life of 1.17 minutes.<sup>14</sup> The primary use of uranium is the production of energy in nuclear power plants.<sup>15</sup> Over sixteen percent of the world's electricity comes from nuclear reactors.<sup>16</sup> In 1973, the Atomic Energy Commission created the National Uranium Resource Evaluation (NURE) program to identify resources in the United States. Findings were made available to the public, including mining companies.<sup>17</sup>

In 1977, the Marline Uranium Corporation began scoping Virginia's potential as a source of uranium. Approximately 62,000 acres of land were leased for exploration in the Piedmont region reaching from Fauquier County in the north to Pittsylvania and Henry Counties in the south.<sup>18</sup>

In 1979, Marline (a wholly-owned subsidiary of Marline Oil Corp.) established a Danville office and began exploratory drilling; on July 1, 1982, it discovered what it characterized as a surface "radiometric anomaly" on the Coles Hill property in Pittsylvania County, and in December 1982 it partnered with Union Carbide

<sup>12</sup> World Nuclear Association, What is Uranium? How Does it Work?, <http://www.world-nuclear.org/education/uran.htm> (last visited Mar. 24, 2010); see also T.G. SCOTT, JR. & VELMA M. SMITH, PIEDMONT ENVTL. COUNCIL, URANIUM: A VIRGINIA CONCERN 13-17 (1982), available at <http://pecva.org/anx/index.cfm/1.391.1319.0.html/Proposed-Uranium-Mining-in-Virginia>.

<sup>13</sup> Jefferson Lab, It's Elemental, The Periodic Table of Elements, <http://education.jlab.org/itselemental/ele092.html> (last visited May 13, 2010).

<sup>14</sup> Institute for Energy and Environment Research, Uranium: Its Uses and Hazards, <http://www.ieer.org/factsheet/uranium.html> (last visited May 13, 2010).

<sup>15</sup> World Nuclear Association, *supra* note 12.

<sup>16</sup> *Id.*

<sup>17</sup> See U.S. Geological Survey (USGS), NURE Publications, <http://pubs.usgs.gov/of/1997/ofr-97-0492/nurepubs.htm> (last visited May 6, 2010).

<sup>18</sup> PIEDMONT ENVTL. COUNCIL, URANIUM IN VIRGINIA: A STATEWIDE CONCERN 2 (1982), available at <http://pecva.org/anx/index.cfm/1.391.1319.0.html/Proposed-Uranium-Mining-in-Virginia>.

for an option on the property to complete the feasibility study.<sup>19</sup> Marline conducted drilling between 1979 and 1984 on the property.<sup>20</sup> By August 1982, Marline provided an estimate of the quantity of uranium on two parts of the Coles Hill site, "North Coles Hill" and "South Coles Hill." South Coles Hill had 21 to 55 million pounds of uranium  $U_3O_8$  and North Coles Hill had 4 to 54.5 million pounds (depending on the concentration of uranium  $U_3O_8$  by weight from 0.150 to 0.025%).<sup>21</sup> With these estimates, Marline focused its efforts solely on the Coles Hill site, leaving most of its other exploratory leases in place until they expired ten or fifteen years later. While the value fluctuates with the uranium market, VUI has estimated current value at between seven and ten billion dollars, assuming a price of between \$60 and \$90 per pound for 119 million pounds (the maximum indicated resources at the 0.025 grade of  $U_3O_8$  cutoff), and other commentators have suggested a much lower quantity and subsequently lower value.<sup>22</sup>

#### B. Uranium Study by Virginia Coal and Energy Commission, 1981-1985

In 1981, the Virginia General Assembly approved House Joint Resolution 324, requesting the Virginia Coal and Energy Commission to evaluate the impacts of uranium production.<sup>23</sup> The Commission established a Uranium Subcommittee, which looked at the issue and visited mines and mills in Texas, New Mexico, and Colorado.<sup>24</sup>

<sup>19</sup> BEHRE DOLBEAR & CO. ET AL., TECHNICAL REPORT ON THE COLES HILL URANIUM PROPERTY, PITTSYLVANIA COUNTY, VIRGINIA, UNITED STATES OF AMERICA 17 (2009), available at <http://www.santoy.ca/i/pdf/43-101ColesHill.pdf>. But see Andrew Rice, *Nuclear Standoff*, THE NEW REPUBLIC, Mar. 12, 2010, available at <http://www.tnr.com/article/world/nuclear-standoff> (reporting more recent statements by Professor Robert Bodnar of Virginia Tech, which suggest a very high probability that other deposits of the same size exist in the Eastern U.S., which would render this less of an "anomaly").

<sup>20</sup> BEHRE DOLBEAR & CO., *supra* note 19, at 23.

<sup>21</sup> *Id.* at 3.

<sup>22</sup> *Uranium Mining Study Moves Forward*, THE COLES HILL PROGRESS (Virginia Uranium, Inc., Chatham, VA), Summer 2009, at 1, available at <http://www.virginiaUranium.com/pdf/Coles%20Hill%20Progress%20Summer09.pdf>; see also BEHRE DOLBEAR & CO., *supra* note 19, at 66; Rex Springston, *Experts at Symposium See Health, Economic Risks in Uranium Mining*, RICHMOND TIMES DISPATCH, Mar. 12, 2010, available at [http://www2.timesdispatch.com/rtd/news/state\\_regional/article/URAN12\\_20100311-223007/329930/](http://www2.timesdispatch.com/rtd/news/state_regional/article/URAN12_20100311-223007/329930/) (including comments by Paul Robinson).

<sup>23</sup> REPORT OF THE VIRGINIA COAL AND ENERGY COMMISSION TO THE GOVERNOR AND THE GENERAL ASSEMBLY OF VIRGINIA, S. DOC. NO. 15, at 10 (1985) (hereinafter "C&E REPORT").

<sup>24</sup> *Id.*

In 1982, the Virginia General Assembly passed legislation allowing a uranium exploration permit program, but prohibiting acceptance of uranium mining applications until the legislature enacted a law permitting a uranium mining program. This statute, still in place today, came to be known as the "moratorium" on uranium mining.<sup>25</sup>

In 1983, the Commission created a Uranium Administrative Group (UAG), comprising heads of seven state agencies and seven citizens appointed by the Commission Chairman, the Governor, and local governing bodies.<sup>26</sup> The UAG was directed to oversee and report on detailed studies of the risks, effects, costs, and benefits of uranium development.<sup>27</sup> It held meetings, made site visits, and obtained a number of expert reports.<sup>28</sup> The Commission extended the deadline for its report until 1985.<sup>29</sup>

In 1984, studies of risks, effects, costs and benefits of uranium development were completed, and the UAG concluded "*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.*"<sup>30</sup> A number of members of the UAG added their own statements, and two dissented from this conclusion.<sup>31</sup>

One of the dissenters, Elizabeth Haskell, then a member of the State Air Pollution Control Board, stated: "the burden of proof is on those who wish mining to proceed and this burden has not been met for me."<sup>32</sup> Noting that Virginia would be the first uranium mining state where annual rainfall exceeds evaporation and where population density was relatively high compared to the uranium mining states of the West, she judged that the risk assessment and cost-benefit analysis underestimated the risks and overstated the benefits of uranium production.<sup>33</sup>

On receiving the full report from the UAG, the Coal and Energy Commission, by a 12-8 vote, recommended proposed draft legislation to the 1985 session of the General Assembly "without specific

<sup>25</sup> See VA. CODE ANN. § 45.1-273 *et seq.* (2009) (regarding exploratory permits); *Id.* § 45.1-283 (establishing the uranium "moratorium" on permit applications).

<sup>26</sup> C&E REPORT, *supra* note 23, at 10.

<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

<sup>29</sup> *Id.*

<sup>30</sup> *Id.* (emphasis in original).

<sup>31</sup> *Id.* at 12.

<sup>32</sup> *Id.* at 21.

<sup>33</sup> *Id.* at 21-27.

endorsement" of such legislation.<sup>34</sup> Although Delegate Paul Councill, Chairman of the Uranium Subcommittee, introduced legislation during the 1985 session of the General Assembly, it was withdrawn "because of its complicated and technical nature."<sup>35</sup>

### C. *Citizen Involvement with the Uranium Issue in the Virginia Piedmont and Southern Virginia*

Beginning with the first leases sought in the Northern Piedmont region of Virginia, citizen and environmental groups became engaged in public debate. The Piedmont Environmental Council (PEC), representing at that time the counties from Loudoun through Nelson along the Blue Ridge, learned from its members that uranium leases were being sought in the region. For example, Orange County farmers Bill and Sandra Speiden were approached in 1979 by Marline to lease their land for uranium exploration and possible mining.<sup>36</sup> As members of PEC they were aware of potential effects on the land and the Rapidan River (on which their farm fronts), but they became even more curious when they were offered a large sign-up bonus. To find answers to their questions they visited mines and mills in Colorado and Utah, where they observed what Bill Speiden characterized as "environmental disasters." With further research on mining and milling in Texas and New Mexico (the Navajo Reservation and the Rio Puerco River), the Speidens replicated their findings in a slide show.<sup>37</sup> They also believed they had learned why Marline was courting them so heavily: the Speidens believed that, based on scintillometer tests, they owned the most radioactive spot in Northern Virginia. When offered a "partnership" in the mining activities, according to Speiden, they declined because they feared the problems observed in the West would be exacerbated in the wetter Virginia climate.

Other landowners in the Northern Piedmont region whose property indicated the presence of uranium had also made their own visits to the West. According to Speiden, all were concerned that the western mines and mills in desert areas had little, if any, human population, and low water tables, in contrast to the higher popula-

tion density and water tables in the rural Piedmont areas of Virginia.

In addition to PEC, Southside Concerned Citizens (SCC) was formed specifically to oppose uranium mining in Southside Virginia where its members worried about pollution in the Dan River watershed.<sup>38</sup> When Marline decided to focus only on the Coles Hill site and not the Northern Piedmont, PEC did not abandon its opposition, but instead continued to support the statewide moratorium and remind the public that studies suggested uranium could be commercially viable in the Northern Piedmont.<sup>39</sup> Citizens felt vindicated when the 1985 legislation was withdrawn, but many ascribe the downfall of uranium mining in Virginia in the 1980s to declining market price. Probably, many factors - the melt-down at Three Mile Island in 1979, continued citizen opposition, the unease that some UAG members expressed, and the complexity of the issue - played a role in the moratorium's continuation.<sup>40</sup> Regardless, by 1990, Marline had abandoned the project,<sup>41</sup> and the General Assembly did not revisit the uranium issue for twenty-three years.

### D. *Virginia Uranium, Inc.*

By 2007, Virginia Uranium, Inc. (VUI) had been formed by several individuals in the Coles Hill area, including Walter Coles, the primary landowner of the two ore sites,<sup>42</sup> and Henry Hurt, a local citizen.<sup>43</sup> VUI was formed as a Virginia corporation and obtained mineral leases for approximately 2,940 acres in the Coles Hill area, 2,296 acres for surface rights (these include, in addition to the Coles property, surface and mineral rights to several other parcels).<sup>44</sup> VUI explained that the 1,508 acres of contiguous land would be used for exploration, mining, milling, waste, tailings management, and setback.<sup>45</sup>

<sup>38</sup> See Tim Davis, *Public Forum Scheduled on Uranium Mining*, STAR-TRIB., Feb. 6, 2008, available at <http://www.wpcva.com/articles/2010/02/19/chatham/Uranium/Uranium52.txt>.

<sup>39</sup> SCOTT & SMITH, *supra* note 12, at 2.

<sup>40</sup> BEHRE DOLBEAR & CO., *supra* note 19, at 2.

<sup>41</sup> *Id.* at 18.

<sup>42</sup> *Id.* at 11-13; see also Max Schulz, *Virginia is Sitting on the Energy Mother Lode*, WALL ST. J. ONLINE, July 26, 2008, <http://www.virginiaUranium.com/pdf/WSJ%20-%20July%2026%20-%202008%20VA%20Sitting%20on%20Energy%20Mother%20Lode.pdf>.

<sup>43</sup> Rice, *supra* note 19.

<sup>44</sup> BEHRE DOLBEAR & CO., *supra* note 19, at 9.

<sup>45</sup> *Id.* at 15.

<sup>34</sup> *Id.* at 7-8.

<sup>35</sup> REPORT OF THE VIRGINIA COAL AND ENERGY COMMISSION TO THE GOVERNOR AND THE GENERAL ASSEMBLY OF VIRGINIA, S. DOC. NO. 17, at 7 (1986).

<sup>36</sup> The material in this paragraph is based on a conversation with Bill Speiden, Nov. 29, 2007, and follow-up emails with Bill Speiden in 2010 (notes on file with author).

<sup>37</sup> Viewed by the author at the 1983 Conference "Piedmont Virginia in the Year 2000," and at meeting with Bill Speiden on Nov. 27, 2007.

VUI describes itself as a local corporation that cares about the community where its primary stockholders live,<sup>46</sup> but this characterization is somewhat misleading. In fact, VUI, a privately held company, is a wholly-owned subsidiary of a Canadian Yukon corporation, VA Uranium Holdings, Inc. (VAUH).<sup>47</sup> Moreover, while the Coles and Bowen families of Pittsylvania own seventy-five percent of VAUH, the rest is owned by other private investors.<sup>48</sup> Twelve percent of VAUH is owned by Virginia Uranium Ltd. (VUL), also a privately held Yukon Corporation presumably created to help fund the Coles Hill project.<sup>49</sup> In 2009, VUL merged with Santoy Resources Ltd., a publicly-traded British Columbia corporation, with expertise in uranium extraction in Canada.<sup>50</sup> VUI controls the leasehold development and operating rights at Coles Hill.<sup>51</sup>

The 2009 merger created Virginia Energy Resources Inc. (VER), another British Columbia corporation, which owns a 22.2% stake in VAUH.<sup>52</sup> Currently, VER is publicly traded on Canada's TSX Venture Exchange for emerging companies.<sup>53</sup> Ron F. Hochstein, President of Denison Mine Corporation (operating Saskatchewan and U.S. mines) is on the VER Board.<sup>54</sup> With this web of Canadian connections, VUI's operation is certainly beyond a local "mom and pop" family business.

As a Canadian corporation, VUI's estimate of uranium (the historical estimates from the 1980s) had to be revised according to standards of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM). Thus, the historical estimates vary greatly from

what CIM states is the "measured resource."<sup>55</sup> A 2009 report includes a measured resource estimate of 8.42 million pounds and an indicated amount of 111 million pounds of uranium resources (based on a cutoff grade of 0.025) in the South and North Coles Hill deposits.<sup>56</sup>

### E. 2008 Uranium Study Bill

In the same year VUI was established, the Virginia Energy Plan was under development. Published in 2007, the Plan mentioned the possibility of uranium mining as a new industry in Virginia and focused on the Coles Hill project, touting its potential economic benefits and minimal impacts.<sup>57</sup>

Also in 2007, the Virginia Department of Mines, Minerals and Energy (DMME) issued a permit to VUI for the purpose of exploratory drilling of forty holes to help the company assess size and depths of uranium deposits<sup>58</sup> and to validate the core samples drilled in the 1980s.<sup>59</sup>

Recognizing that the Virginia General Assembly would need to lift the moratorium before mining could proceed, VUI's Walter Coles, and his colleague, Henry Hurt, met with interested parties, including former members of the UAG, members of the General Assembly, and a variety of environmental and civic organizations to seek support for a renewed uranium project. Both men agreed that a study by an independent entity should be done prior to seeking the lifting of the moratorium and said they would seek legislation to establish such a study, which VUI would fund. At the time, it was estimated the study would cost up to \$1 million.<sup>60</sup>

<sup>46</sup> See Virginia Uranium, Inc., Ownership, <http://www.virginiauranium.com/ownership.php> (last visited Mar. 24, 2010).

<sup>47</sup> VA. ENERGY RES. INC., BUSINESS ACQUISITION REPORT 2.1 (2009), available at [www.sedar.com](http://www.sedar.com) (search "Virginia Energy Resources;" then view company document, title is listed in 2009).

<sup>48</sup> See Virginia Uranium, Inc., Ownership, *supra* note 46.

<sup>49</sup> BEHRE DOLBEAR & CO., *supra* note 19, at 4.

<sup>50</sup> *Id.*

<sup>51</sup> *Id.*

<sup>52</sup> See NORMAN W. REYNOLDS, SANTOY RESOURCES LTD., INVESTOR PRESENTATION 15 (2009), available at <http://www.santoy.ca/i/pdf/CorporatePresentation.pdf>; Virginia Uranium, Inc., Home, <http://www.virginiauranium.com> (last visited Mar. 24, 2010).

<sup>53</sup> See VA. ENERGY RES. INC., *supra* note 47; SANTOY RES. LTD. & VIRGINIA URANIUM LTD., MANAGEMENT INFORMATION CIRCULAR 6 (2009), available at [www.sedar.com](http://www.sedar.com) (search "Virginia Energy Resources;" then view company document, title is listed in 2009).

<sup>54</sup> Commentaries, THE COLES HILL PROGRESS (Virginia Uranium Inc., Chatham, VA), Fall/Winter 2009, at 1-2, available at [http://www.virginiauranium.com/pdf/Coles\\_Hill\\_Progress\\_Fall\\_Winter2009.pdf](http://www.virginiauranium.com/pdf/Coles_Hill_Progress_Fall_Winter2009.pdf).

<sup>55</sup> BEHRE DOLBEAR & CO., *supra* note 19, at 63 (the "resource" will not be considered a "reserve" until it is shown to be an "economically mineable" part of the resources, which will be dependent on a feasibility study of production as well as regulatory requirements).

<sup>56</sup> *Id.* at 64-66.

<sup>57</sup> See VA. DEP'T OF MINES, MINERALS AND ENERGY, VIRGINIA ENERGY PLAN 50-51 (2007), available at [http://www.saferalliance.net/renewsouth/downloads/2007\\_VA\\_Energy\\_Plan-Full\\_Document.pdf](http://www.saferalliance.net/renewsouth/downloads/2007_VA_Energy_Plan-Full_Document.pdf).

<sup>58</sup> Press Release, Dep't of Mines, Minerals and Energy, State Issues Exploration Permit to Virginia Uranium (Nov. 28, 2007) available at <http://www.dmme.virginia.gov/newsreleases/2007releases/Uraniumpermit.pdf>.

<sup>59</sup> Joseph Aylor, *Current Understanding of the Coles Hill Uranium Deposit, Southside Virginia*, 42 GEOLOGICAL SOC'Y OF AM. 169 (2010), available at [http://gsa.confex.com/gsa/2010NE/finalprogram/abstract\\_169376.htm](http://gsa.confex.com/gsa/2010NE/finalprogram/abstract_169376.htm) (abstract describing the Coles Hill deposit as being composed of two structurally different ore bodies bounded on the east by the Chatham fault, the western boundary fault of the Danville Triassic basin).

<sup>60</sup> But see John Crane, *Uranium Mining Study Gets Official Green Light*, DANVILLE NEWS, Feb. 23, 2010, available at [http://www2.godanriver.com/gdr/news/local/danville\\_](http://www2.godanriver.com/gdr/news/local/danville_)

In January 2008, Senate Bill 525 was introduced to establish the Virginia Uranium Mining Commission to assess the risks and benefits of developing uranium resources in the Commonwealth.<sup>61</sup> The commission would oversee contracting for a comprehensive and independent scientific study of (1) the effects of uranium production on surface and ground water, air quality, public health, and occupational health risks; (2) potential damage to agriculture and wildlife; and (3) impacts on historic and archeological resources, open space, future economic development and tourism.<sup>62</sup> In addition, the legislation proposed review of potential impacts on nearby communities and the current state of technology and management of mining and milling plus other necessary site specific studies.<sup>63</sup> Moreover, the bill called for an analysis of statutory and regulatory mechanisms to allocate liability, ensure financial resources for operation and cleanup, and several other matters.<sup>64</sup> Although the legislation listed no funding sources, legislators understood that VUI would supply funds to the Commonwealth.<sup>65</sup>

After a hearing and favorable vote by the Senate Committee on Agriculture, Conservation and Natural Resources, the study bill passed the Virginia Senate, 36-4.<sup>66</sup> However, in the House of Delegates, the Rules Committee killed the bill by voice vote.<sup>67</sup> Although the battle had been joined by many top-paid Virginia lobbyists and conservation groups, the legislative defeat was a short-term victory for opponents of lifting the moratorium.

In 2007, VUI hired lobbyists from three major lobbying firms, Vectre Corporation, Hunton and Williams, and Kemper Consulting to represent VUI in the 2008 General Assembly, drafting the study

bill, and attempting to negotiate with conservation groups on its terms.<sup>68</sup> In 2008-2009, McGuire Woods Consulting was added.<sup>69</sup>

As of the latest lobbyist reporting period ending July 1, 2009, VUI had paid its lobbyists, including two former officials from Democratic and Republican Administrations, Whit Clement and Frank Atkinson, a total of \$214,111.54 from 2007-2009.<sup>70</sup> For the current period (2009-2010), lobbyists from the four firms are again registered as lobbyists for VUI.<sup>71</sup> Since 2008, the conservation community has been represented by staff from the Piedmont Environmental Council; Sierra Club, Virginia Chapter; Southern Environmental Law Center; and the Virginia League of Conservation Voters.<sup>72</sup> Members of Southside Concerned Citizens and the Dan River Basin Association, along with local citizens from Pittsylvania County, testified at the 2008 General Assembly. They and others – Halifax Town Council, Halifax Chamber of Commerce, the Cities of Norfolk and Virginia Beach—have been involved in subsequent public meetings.

#### F. Virginia Coal and Energy Commission: Uranium Study II

The failure of the legislative study led the Chairman of the Virginia Commission on Coal and Energy (“Commission”) to propose that the Commission consider overseeing a study of uranium mining and milling. The study proposal thus took a more deliberative and public path than the often frantic and on-the-spot negotiations characteristic of the General Assembly.<sup>73</sup> At a public meeting, the Commission requested the Virginia Center for Coal and Energy Research at Virginia Tech (VT Center) “to enter into an agreement with the National Academy of Sciences (the Academy) or

news/article/uranium\_mining\_study\_gets\_official\_green\_light/18279 (reporting the cost of the study in 2010 at \$1.4 million).

<sup>61</sup> See S. 525, 2008 Leg. Sess. (Va. 2008), available at <http://leg1.state.va.us/cgi-bin/legp504.exe?0810l+SB525>.

<sup>62</sup> *Id.*

<sup>63</sup> *Id.*

<sup>64</sup> *Id.*

<sup>65</sup> *Id.* (notes from public hearings on file with author).

<sup>66</sup> See Virginia General Assembly, Legislative Information System, SB 525 Uranium Mining Commission; Established, Report, <http://leg1.state.va.us/cgi-bin/legp504.exe?ses=081&typ=bil&val=sb525> (last visited Apr. 4, 2010).

<sup>67</sup> *Id.*

<sup>68</sup> See Secretary of the Commonwealth – Janet Polarek, Lobbyist Registration Database, [www.commonwealth.virginia.gov/stategovernment/lobbyist/database.cfm](http://www.commonwealth.virginia.gov/stategovernment/lobbyist/database.cfm) (last visited May 2, 2010) (follow “Principal Search” link; search “Virginia Uranium, Inc.” under “Principal,” and “2007-08” under “Registration Year”).

<sup>69</sup> *Id.* (search “2008-09” under “Registration Year”).

<sup>70</sup> *Id.* (search “Disclosure Reports”; see also Rice, *supra* note 19 (stating that Whitt Clement is Coles’ brother-in-law, and investor Henry Hurt is the father of State Senator Robert Hurt)).

<sup>71</sup> See Secretary of the Commonwealth – Janet Polarek, Lobbyist Registration Database, [www.commonwealth.virginia.gov/stategovernment/lobbyist/database.cfm](http://www.commonwealth.virginia.gov/stategovernment/lobbyist/database.cfm) (last visited May 2, 2010) (follow “Principal Search” link; search “Virginia Uranium, Inc.” under “Principal,” and “2009-10” under “Registration Year”).

<sup>72</sup> See *id.*

<sup>73</sup> See generally BARNIE DAY & BECKY DALE, NOTES FROM THE SAUSAGE FACTORY (Barnie Day & Becky Dale eds., Brunswick Publ’g 2005) (discussing the frantic negotiations characteristic of the General Assembly).

other comparable scientific or academic institutions, independent of the Center, to conduct a wide-ranging study on the impact of uranium mining in the Commonwealth," with Dr. Michael Karmis, VT Center Director, representing the Center.<sup>74</sup> The Commission assigned oversight of the study to a "Uranium Subcommittee" composed of legislative and citizen members from the Commission.<sup>75</sup>

Over the next six months, the Uranium Subcommittee held a series of public meetings for comment on the scope of the study and to review recommendations for the scientific study and a socio-economic study.<sup>76</sup> The Commission finalized a scope for the scientific study at its meeting in May 2009.<sup>77</sup> The National Academy of Sciences has agreed to undertake the study, and has set a target pre-publication report release for December, 2011.<sup>78</sup> At press time, neither the final scope of a socio-economic study nor a study consultant has been determined.<sup>79</sup>

### G. Other Studies

Previously, the Halifax Chamber of Commerce, representing a county downstream from Coles Hill, presented its study, "Community Concerns Related to Uranium Mining in Virginia" to the Uranium Subcommittee.<sup>80</sup> This 131-page analysis reviews reports from government agencies, scientists, and professional groups, interviews with VUI officials, citizens, and environmental advocacy groups, and it discusses such issues as health, environmental, and

<sup>74</sup> VA. COAL AND ENERGY COMM'N, MOTION (2008), available at <http://dls.state.va.us/groups/cec/110608/Motion.pdf>.

<sup>75</sup> *Id.*; see also Coal and Energy Commission, <http://dls.state.va.us/groups/cec/uranium/meetings.htm> (last visited Mar. 26, 2010) (containing a link for list of members).

<sup>76</sup> See VA. COAL AND ENERGY COMM'N, *supra* note 74 (the committee met three times in Richmond and once in Chatham).

<sup>77</sup> See VA. COMM'N ON COAL AND ENERGY, MEETING SUMMARY 3-4 (2009), available at <http://dls.state.va.us/GROUPS/cec/120309/sm120309.pdf>; Letter from Anthony R. de Souza, Director, Nat'l Acad. of Sci., to Dr. Michael E. Karmis, Director, Virginia Ctr. for Coal and Energy Research (Nov. 23, 2009), available at <http://dls.state.va.us/groups/cec/120309/letter.pdf> (including final scope of scientific study).

<sup>78</sup> National Academy of Science, Board on Earth Sciences and Resources, Ongoing Studies Uranium Mining in Virginia, <http://dels.nas.edu/besr/uranium.shtml> (last visited Apr. 5, 2010).

<sup>79</sup> See VA. COMM'N ON COAL AND ENERGY, *supra* note 74, at 4; John Crane, *Official Says Hearing Needed on Uranium Mining*, DANVILLE REG. & BEE, Apr. 25, 2010, available at [http://www2.godanriver.com/gdr/news/local/article/official\\_says\\_hearing\\_needed\\_on\\_uranium\\_mining/20459/](http://www2.godanriver.com/gdr/news/local/article/official_says_hearing_needed_on_uranium_mining/20459/).

<sup>80</sup> See HALIFAX COUNTY CHAMBER OF COMMERCE, COMMUNITY CONCERNS RELATED TO URANIUM MINING IN VIRGINIA (2008), available at [http://www.halifaxchamber.net/public.assets/Uranium-Mining/file\\_11.pdf](http://www.halifaxchamber.net/public.assets/Uranium-Mining/file_11.pdf).

socio-economic issues in order to provide suggestions for the scope and methodology of the National Academy of Sciences study as well as the socio-economic study.

In addition, the Danville Regional Foundation has issued a Request for Qualifications for a "Regional Socioeconomic Study of [the] Impact of Uranium Mining and Milling."<sup>81</sup> The Foundation seeks a study conducted by an organization that is "located outside of Virginia and is without conflicts of interest."<sup>82</sup> At press time, the Foundation anticipates receiving full proposals from eight organizations and approval of one entity by mid-August 2010.

Recently, the City of Virginia Beach commissioned a \$437,000 Phase I study of the worst case scenario of a catastrophic accident or storm event at Coles Hill, upstream from Lake Gaston, N.C., the City's water supply.<sup>83</sup> The study will focus on "Probable Maximum Precipitation" (PMP) storms, which produce the greatest depth of precipitation for a given duration in a particular geographic location.<sup>84</sup> According to Virginia Beach Director of Public Utilities, Thomas Leahy, PMP storms can occur on the eastern ridge of the Blue Ridge Mountains.<sup>85</sup> Phase 1 of the study, which will be completed by fall 2010, will model the downstream transport of mill tailings to Kerr Reservoir to assess the likelihood of contamination of Lake Gaston, and may be extended into Phase II for more detailed analysis if necessary.<sup>86</sup> This type of site-specific research will not be conducted by the National Academy of Sciences.<sup>87</sup>

In addition, VUI has announced that a scoping study is underway that will analyze "the mining concepts of the project" and provide "an overview for estimated production costs and an analysis on the number and types of jobs that would be created."<sup>88</sup>

<sup>81</sup> See DANVILLE REG'L FOUND., REQUEST FOR QUALIFICATIONS (2009), available at <http://www.danvilleregionalfoundation.org/documents/RFQ-Uranium.pdf>.

<sup>82</sup> *Id.*; E-mail response to author's inquiry dated March 25, 2010 from Karl Stauber, Executive Director, DRF (on file with author).

<sup>83</sup> Deirdre Fernandes, *In Uranium Mining Issue, It's Beach vs. the State*, NORFOLK STAR LEDGER, Jan. 13, 2010, available at <http://hamptonroads.com/2010/01/uranium-mining-issue-its-beach-vs-state>.

<sup>84</sup> Nicholas Elmes, *Uranium Threat to Local Lakes Under Study*, SOUTH HILL ENTERPRISE, Jan. 20, 2010, available at <http://www.vancnews.com/articles/2010/01/21/warrenton/news/news54.txt>.

<sup>85</sup> *Id.*

<sup>86</sup> *Id.*

<sup>87</sup> See *infra* Part V.

<sup>88</sup> Press Release, Virginia Uranium, Inc., Scoping Study Firm Selection (Mar. 5, 2010), available at [http://www.virginiauranium.com/pdf/VUI+Scoping+Study+Firm+Selection+03\\_05\\_2010%5B1%5D.pdf](http://www.virginiauranium.com/pdf/VUI+Scoping+Study+Firm+Selection+03_05_2010%5B1%5D.pdf).

## II. ENVIRONMENTAL IMPACTS OF URANIUM MINING AND MILLING

In order to produce uranium for use in the nuclear fuel cycle, it must be mined, crushed, ground, and treated with acid or alkaline solution to dissolve and recover the uranium.<sup>89</sup> The waste includes over-burden from mining and "tailings" from the milling process.<sup>90</sup>

Conventional methods of mining include underground mining – similar to underground coal mining in which the ore is removed in underground shafts – and open pit or surface mining, similar to quarries where the earth is moved to extract ore closer to the surface.<sup>91</sup> The heap leach method has also been used to extract uranium from uncrushed rock ore by spraying the ore with acid; the extracted solution is collected and further processed by a method known as ion exchange.<sup>92</sup> In addition, *in situ* leachate (ISL) (also known as *in situ* recovery) combines mining and milling in one process whereby chemicals are pumped into the earth, chemically altering the ore, which is pumped to the surface and further refined.<sup>93</sup> Because ISL is considered milling, it is regulated by the Nuclear Regulatory Commission.<sup>94</sup> Conventional uranium mining by pit or underground method is regulated by the states.<sup>95</sup> VUI consultants have stated that uranium at Coles Hill could be milled by either alkaline or acid methods, presumably through conventional, not ISL, mills.<sup>96</sup>

According to the U.S. Energy Information Administration, at the end of 2008, seventeen mines had operated during part or all of the year; six of these were ISL operations and ten were underground mines.<sup>97</sup> During the same time period, there were four conventional uranium mills in the United States, but only one, the White Mesa Mill in Utah, was operating; there were nine ISL plants but only six operating: Alta Mesa (Texas), Crow Butte (Nebraska), Kingsville Dome (Texas), Rosita (Texas), Smith

<sup>89</sup> See U.S. NRC, Uranium Recovery, <http://www.nrc.gov/materials/uranium-recovery.html> (last visited Mar. 25, 2010); World Nuclear Association, *supra* note 6, at 2.

<sup>90</sup> U.S. NRC, Uranium Recovery, *supra* note 89.

<sup>91</sup> *Id.*

<sup>92</sup> *Id.* (stating that heap leach facilities no longer exist, but that heap leaching occurs at some mills).

<sup>93</sup> *Id.*

<sup>94</sup> *Id.*

<sup>95</sup> See *infra* Part III.

<sup>96</sup> BEHRE DOLBEAR & CO., *supra* note 19, at 59-61.

<sup>97</sup> U.S. ENERGY INFO. ADMIN. [EIA], INDEPENDENT STATISTICS AND ANALYSIS, DOMESTIC URANIUM PRODUCTION REPORT (2009), available at <http://www.eia.doe.gov/cneaf/nuclear/dupr/dupr.html>.

Ranch-Highlands Operation (Wyoming), and Vasquez (Texas).<sup>98</sup> Shipments of uranium concentrate from the mill and ISL plants were 4.1 million pounds in 2008.<sup>99</sup> According to the Uranium Producers of America, no open pit mining operations are active in the United States.<sup>100</sup> Although VUI has stated publicly that ISL is inappropriate for Virginia conditions,<sup>101</sup> I will briefly discuss its impacts in Part III (H).

### A. Potential Impacts Identified in 1985 Uranium Study

In her dissenting opinion in the 1985 UAG report, Elizabeth Haskell stated:

If Virginia allows uranium mining and milling it would be the first state to do so in a climate where rainfall exceeds evaporation and where many people would be exposed potentially to the resulting radiation in the water and air. Previous domestic uranium mining has been in arid, sparsely populated Western regions where transmission of radiation in water is not a concern. In Virginia's wet climate where water is discharged from the site and filters through tailings, the transmittal of radiation to people through streams and the groundwater is a major issue.<sup>102</sup>

Haskell criticized the UAG report for citing French uranium mines but failing to produce data on the records of the sites, as the report said the location of the mines was comparable to that of Virginia.<sup>103</sup> She also pointed out that the cost-benefit estimates assumed no negative impacts on ground or surface waters, i.e., "no leaching of radioactive wastes or heavy metals to groundwaters that are used by neighbors, no substantial polluted discharges to streams, no accidents, no long-term deterioration or collapse of the

<sup>98</sup> *Id.* White Mesa Mill is owned by Denison Mines, a Canadian corporation. Denison Mines, White Mesa Mill, <http://www.denisonmines.com/SiteResources/ViewContent.asp?DocID=96&vIID=&RevID=566&lang=1> (last visited May 13, 2010). Ron F. Hochstein, Denison CEO, is also a member of the VER Board of Directors. See *Commentary*, THE COLES HILL PROGRESS, *supra* note 54 at 1.

<sup>99</sup> *Id.*

<sup>100</sup> Uranium Producers of America, Conventional Mining and Milling of Uranium Ore, <http://www.uraniumproducersamerica.com/tech.html> (last visited Mar. 25, 2010).

<sup>101</sup> Mick Mastilovic, VUI Vice President of Operations, Upper Roanoke River Basin Roundtable, Uranium Workshop (Aug. 14, 2009) (notes on file with author). Other scientists have also stated to the author that the impermeability of the uranium formation in the rock would also make ISL an inappropriate technique (notes on file with author).

<sup>102</sup> C&E REPORT, *supra* note 23, at 21.

<sup>103</sup> *Id.* at 22.

100 foot high tailings pile by flood, earthquake, erosion or design failure for the thousands of years the tailings are radioactive."<sup>104</sup>

Discrepancies in the reporting of the cancer death forecast also concerned her, and Haskell commented that many health risks, other than neighbors' cancer mortality, were not estimated.<sup>105</sup> In addition, she stated that the cost estimates for the Commonwealth to regulate uranium did not include post-closure costs and costs in the event of a closure failure, accident or natural disaster.<sup>106</sup>

### B. Potential Impacts of Uranium Mining on Human Health and the Environment

With a renewed interest in nuclear power worldwide as a climate-neutral source of energy, uranium production has gained attention.<sup>107</sup> Unfortunately, the environmental and health impacts of such production have received less focus. Recent findings indicate that uranium may be more toxic than previously believed: harming human organs and the brain, causing DNA damage, weakening the immune system, and disrupting hormone balance.<sup>108</sup>

Research shows that uranium and its byproducts are insidious in a variety of media and contexts.<sup>109</sup> An unpublished study found airborne levels of uranium ten times higher than background levels near a mine in New Mexico.<sup>110</sup> Because elevated levels of uranium and thorium could be detected approximately eight miles from the mine, researchers pointed to the potential for windblown dust to spread uranium particles.<sup>111</sup>

Equally troubling was data showing that uranium concentration in vegetation led to elevated uranium in the livers and kidneys of exposed cattle in New Mexico, and elevated levels of uranium in

<sup>104</sup> *Id.* at 24.

<sup>105</sup> *Id.* at 25.

<sup>106</sup> *Id.*

<sup>107</sup> Frank Winde, *Uranium Pollution of Water Resources in Mined-Out and Active Gold-fields of South Africa – A Case Study in the Wonderfontein spruit Catchment on Extent and Sources of U-Contamination and Associated Health Risks*, in ABSTRACTS OF THE INTERNATIONAL MINE WATER CONFERENCE PROCEEDINGS 772 (Pretoria, South Africa 2009), available at [http://www.imwa.info/docs/imwa\\_2009/IMWA2009\\_Winde.pdf](http://www.imwa.info/docs/imwa_2009/IMWA2009_Winde.pdf). However, some commentators point out that mining and milling and production of uranium fuel is not carbon-neutral and climate friendly.

<sup>108</sup> *Id.* at 779.

<sup>109</sup> Doug Brugge et al., *Exposure Pathways and Health Effects Associated with Chemical and Radiological Toxicity of Natural Uranium: A Review*, 20:3 REVIEWS ON ENVTL. HEALTH 177, 180-182 (2005).

<sup>110</sup> *Id.* at 180.

<sup>111</sup> *Id.*

caribou in North Saskatchewan, where aboriginal communities depend on caribou as a food source.<sup>112</sup> This review of a variety of other studies demonstrated uranium's damaging impact on kidneys, on DNA of nonsmokers who lived near mines or mills in Texas and of mine workers in the former country of Zaire, and on respiratory systems of miners exposed not only to uranium but also to other airborne toxics in mines.<sup>113</sup>

Interestingly, it was gold, rather than uranium, mining that has led to uranium pollution in South Africa.<sup>114</sup> Gold mining tailings contain uranium, and some of these tailings have entered aquifers and nearby streams.<sup>115</sup> Changes in uranium pollution levels since 1997 indicate an increase in uranium at some sampling points.<sup>116</sup> A 1997 South African study linked naturally elevated uranium levels in domestic groundwater to an increased incidence of blood abnormalities related to leukemia among rural residents of South Africa's Northern Cape.<sup>117</sup> South Africa, a major source of uranium worldwide, has been expanding its own nuclear facilities, and studies indicate high levels of uranium pollution. Specifically, these high levels have appeared in the catchment area of the Wonderfontein spruit and through underground aquifers, and have been statistically linked to the increased leukemia among rural people living in the Northern Cape.<sup>118</sup>

Closer to home, the Navajo Nation has been outspoken in its opposition to renewed mining and milling on its western reservation lands. Since 2005, the Navajo have had a moratorium on mining on the reservation.<sup>119</sup> Joe Shirley, President of the Navajo Nation, testified to a U.S. Senate Oversight Committee in 2008 about Crownpoint, New Mexico:

For years a company has attempted to mine uranium using the *in situ* process here. The majority of the population of

<sup>112</sup> *Id.* at 181.

<sup>113</sup> *Id.* at 187-189; see also Jamie deLemos et al., *Lessons from the Navajo: Assistance with Environmental Data Collection Ensures Cultural Humility and Data Relevance*, 1:4 PROGRESS IN CMTY. HEALTH P'SHIPS: RES., EDUC., AND ACTION 321 (2007).

<sup>114</sup> Winde, *supra* note 107.

<sup>115</sup> *Id.* at 772-76.

<sup>116</sup> *Id.* at 775-76.

<sup>117</sup> *Id.* at 778.

<sup>118</sup> *Id.*

<sup>119</sup> See Press Release, The Navajo Nation, Navajo Nation President Joe Shirley, Jr. Signs Diné Natural Resources Protect Act of 2005 (Apr. 30, 2005), available at <http://www.sric.org/uranium/Navajo%20pres.%20signs%20uranium%20ban.%20for%20April%2030.pdf> (announcing new law banning uranium mining and processing throughout the Navajo Nation).

Crownpoint has consistently opposed any attempted mining. . . .

The area where this mining would take place is located next to a school and is only several hundred feet from the sole drinking water source for more than 3000 Navajos. While we have been promised that *in situ* leach mining is a harmless process, one need only watch a stream flow to understand that a liquid will follow its own path. No one here can guarantee me that once this toxic solution is in the ground that it won't move of its own accord and contaminate our drinking water . . . .<sup>120</sup>

The Navajo's concerns are underlined by scientific research that points to continued exposure of the Navajo through unremediated mines and efforts to open new *in situ* sites in Crownpoint and Churchrock, New Mexico.<sup>121</sup> Other researchers echo President Shirley's concern, pointing to health issues in communities such as Monticello, Utah, where water and soils contaminated by a local mine and mill have had harmful health impacts on residents.<sup>122</sup>

The primary exposure in Monticello, dust from the mill, contaminated workers and affected surface and ground water.<sup>123</sup> Montezuma Creek, running through the site, carried radioactive contaminants downstream and deposited them on a plain where measurably contaminated soils leached into groundwater.<sup>124</sup> While not absolutely correlated to uranium exposure, Monticello residents have exhibited unusually high rates of diseases related to radiation and uranium exposure, and studies show significantly higher mortality rates for area residents during the time of mill operations.<sup>125</sup> The area also shows a higher than normal incidence of childhood leukemia and nonmalignant respiratory disease.<sup>126</sup>

<sup>120</sup> Testimony Before the United States Senate Committee on Energy and Natural Resources, 110th Cong. (2008) (testimony of Joe Shirley, Jr., Pres. of the Navajo Nation), available at <http://www.sric.org/1872/PresidentShirleyTestimonyNavajoNation031208.pdf>.

<sup>121</sup> Doug Brugge & Rob Goble, *The Radiation Exposure Compensation Act: What is Fair?*, 13:4 NEW SOLUTIONS 385, 392 (2003), reprinted in THE NAVAJO PEOPLE AND URANIUM MINING 137 (Doug Brugge, et al. eds., Univ. of N.M. Press 2006).

<sup>122</sup> Brett T. Bunkall, *The Uranium Mining and Milling Industry in Utah*, 26 J. LAND RESOURCES & ENVTL. L. 375, 379 (2006).

<sup>123</sup> *Id.*

<sup>124</sup> *Id.*

<sup>125</sup> *Id.* at 380.

<sup>126</sup> *Id.*

Uranium may also contribute to the increased rate of kidney disease among the Navajo.<sup>127</sup> Researchers considering ethical aspects of uranium mining concluded that the Navajo Nation's prohibition on future mining "was made despite the scientific uncertainties in ISL mining. While we rely on scientific certainty to define risks, past experiences, upholding one's environmental ethics can be the basis of decision making as well."<sup>128</sup>

### C. Potential Impacts of Uranium Mining and Milling in Virginia

The Coles Hill site is drained by the adjacent Mill Creek, a tributary of Whitehorn Creek which enters the Banister River, part of the Dan River Basin,<sup>129</sup> and a sub-basin of the larger Roanoke River watershed. This watershed includes Kerr Reservoir, Lake Gaston, and a variety of municipal public water supplies, such as Halifax and Clarksville, Virginia, Henderson and Oxford, North Carolina, and smaller community water systems.<sup>130</sup> Lake Gaston provides the water for Virginia Beach, the Commonwealth's largest city, Chesapeake, and Norfolk.<sup>131</sup>

In the past, VUI has shared a PowerPoint presentation with visitors<sup>132</sup> that explains its plans and touts reclamation, such as that at a former uranium mill in Canonsburg, Pennsylvania, which is listed as an EPA Superfund site.<sup>133</sup> At Canonsburg, the tailings pond

<sup>127</sup> Jamie L. deLemos et al., *Development of Risk Maps to Minimize Uranium Exposures in the Navajo Churchrock Mining District*, 8:29 ENVTL. HEALTH at \*3 (2009), available at <http://www.ehjournals.net/content/8/1/29> (citing four studies).

<sup>128</sup> Bindu Panikkar & Doug Brugge, *The Ethical Issues in Uranium Mining Research in the Navajo Nation*, 14 ACCOUNTABILITY IN RES. 121, 147 (2007).

<sup>129</sup> BEHRE DOLBEAR & CO., *supra* note 19, at 16; see also Dan River Basin Association, Map of the Watershed, <http://www.danriver.org/Maps/WatershedMap-Large.htm> (last visited Mar. 28, 2010).

<sup>130</sup> Piedmont Environmental Council of Virginia, Drinking Water Sources Downstream from Proposed Coles Hill Uranium Mining Site, [http://www.pecva.org/anx/ass/library/19/coleshill\\_water.pdf](http://www.pecva.org/anx/ass/library/19/coleshill_water.pdf) (last visited Mar. 30, 2010).

<sup>131</sup> CITY OF VIRGINIA BEACH, *supra* note 11, at 2. Virginia Beach and Chesapeake own a raw water intake and pump station at Lake Gaston. Lake Gaston water is also pumped to Norfolk's reservoirs in Isle of Wight and Suffolk, and Norfolk delivers an equivalent amount of water to Virginia Beach. Because of these interconnections, Lake Gaston water is intermixed in three city water supplies and, during the 2007-08 drought, supplied about one third of the total municipal water in Southside Hampton Roads. *Id.*

<sup>132</sup> Author viewed this PowerPoint presentation as a visitor in the spring of 2008.

<sup>133</sup> See Betty Joyce Nash, *Science Panel May Study Virginia Uranium Plan*, REGION FOCUS, Winter 2009, at 22, 23 (briefly discussing the Canonsburg site).

had been capped and the site had become a local baseball diamond.<sup>134</sup>

However, a health study reported that children who lived near the Canonsburg site and who were tested for Lead 210 (a radioactive isotope) had high concentrations similar to those found in the urine of uranium workers.<sup>135</sup> Of the children tested, over one-half had levels that were at least four times greater than the average level of Lead 210 present in adult nonsmokers.<sup>136</sup> While there were an unusually high number of childhood cancers in this community, no follow-up research was performed, and the EPA cancelled further studies that may have illuminated the results.<sup>137</sup> The study, however, raises concerns about the continuing impact of inactive sites on nearby communities.

### III. URANIUM MINING AND MILLING LAW

#### A. Types of Mining

In producing nuclear fuel, uranium and its wastes expose humans to potential public hazards in the mining process; namely, the overburden or waste rock remaining after extraction of ore and the waste or tailings created during the milling process.<sup>138</sup>

In mining, the ore is extracted from underground mines or open pits and is then separated and concentrated during a milling process whereby powerful acids or alkalines leach uranium from the ore.<sup>139</sup> *In situ* leach (ISL) operations combine the mining and milling into one step (for purposes of regulation, ISL is considered milling); acids and other leaching chemicals are injected directly underground, and uranium concentrate is then pumped out through underground wells and further processed.<sup>140</sup>

<sup>134</sup> Rosalie Bertell, *Environmental Influences on the Health of Children*, presented to International Conference on Children's Health and the Environment, Amsterdam (Aug. 13, 1998), available at [http://hicph.org/children\\_health](http://hicph.org/children_health).

<sup>135</sup> *Id.*

<sup>136</sup> *Id.* (reporting over half of children testing with levels above 0.2 pCi per 24-hour sample, while the expected level of an adult nonsmoker is 0.05 pCi per 24-hour sample).

<sup>137</sup> *Id.*

<sup>138</sup> See U.S. Environmental Protection Agency, *Uranium Mill Tailings*, <http://www.epa.gov/radiation/docs/radwaste/402-k-94-001-umt.html> (last visited Mar. 29, 2010).

<sup>139</sup> See U.S. NRC, *Uranium Recovery*, <http://www.nrc.gov/materials/uranium-recovery.html> (last visited Mar. 29, 2010).

<sup>140</sup> *Id.*

#### B. Summary of Federal Regulatory Process

Under the Uranium Mill Tailing Radiation Control Act (UMTRCA), the Nuclear Regulatory Commission (NRC) takes the lead role in licensing and regulating uranium milling and combined ISL mining-milling operations.<sup>141</sup> States may apply to the NRC to become Agreement States, taking over the NRC's regulatory functions regarding milling and/or ISL.<sup>142</sup> States retain the authority to regulate underground or open-pit uranium mining.<sup>143</sup>

The Environmental Protection Agency (EPA) also has a hand in the regulation of uranium production.<sup>144</sup> The EPA establishes specific standards for the NRC to enforce, and it directly regulates some aspects of uranium production under the Clean Water Act (CWA), Clean Air Act (CAA) and Safe Drinking Water Act (SDWA). The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or "Superfund") is also administered by the EPA, and has played a role in the cleanup of inactive uranium mining and milling facilities. Further, while the overburden material remaining after mining is not regulated by the federal government, the EPA is reviewing "Technologically Enhanced Naturally Occurring Radioactive Materials" (TENORM),<sup>145</sup> which includes radionuclides that may be altered by human activities such as mining and milling.<sup>146</sup>

#### C. History of Uranium Mill Tailings Radiation Control Act (UMTRCA)

Prior to the 1970s, uranium was governed by the Atomic Energy Act (AEA), with little oversight of the environmental issues associated with it. UMTRCA, enacted in 1978, amended the AEA and added provisions to address the disposal and stabilization of mill tailings, and to minimize or eliminate radiation health hazards to

<sup>141</sup> See 42 U.S.C. § 7901 (2006) (under the "Short Title" section is a list of the statutes associated with the 1978 and 1988 versions of UMTRCA).

<sup>142</sup> See 42 U.S.C. § 2021(b)(1)-(3) (2006); see also U.S. NRC, *Agreement State Program*, <http://www.nrc.gov/about-nrc/state-tribal/agreement-states.html> (last visited Mar. 28, 2010).

<sup>143</sup> See 40 C.F.R. § 190.02 (b) (2009).

<sup>144</sup> See U.S. Environmental Protection Agency, *Uranium Mill Tailings*, <http://www.epa.gov/radiation/docs/radwaste/402-k-94-001-umt.html> (last visited Mar. 29, 2010).

<sup>145</sup> See ENVTL. PROT. AGENCY, *TECHNOLOGICALLY ENHANCED NATURALLY OCCURRING RADIOACTIVE MATERIALS FROM URANIUM MINING VOL. I: MINING AND RECLAMATION BACKGROUND 402-R-08-005* (2008).

<sup>146</sup> NAT'L RESEARCH COUNCIL, *EVALUATION OF GUIDELINES FOR EXPOSURES TO TECHNOLOGICALLY ENHANCED NATURALLY OCCURRING RADIOACTIVE MATERIALS I* (1999), available at [http://books.nap.edu/catalog.php?record\\_id=6360](http://books.nap.edu/catalog.php?record_id=6360).

the public from these tailings.<sup>147</sup> UMTRCA contains two programs: Title I for a federal-state funded program for remedial action at abandoned or inactive mill tailings sites that existed prior to 1978,<sup>148</sup> and Title II for all active uranium mill sites (which would include the Coles Hill site) licensed by the Nuclear Regulatory Commission or states after 1978.<sup>149</sup> The goal of the Act was to bring "previously unregulated radioactive end products of the source material extraction process within the scope of NRC regulation."<sup>150</sup>

Although the EPA plays a role in promulgating regulations and standards to protect water and air quality and public health, the NRC is responsible for implementing these regulations in the issuance of licenses to mills and for enforcing these standards.<sup>151</sup>

#### D. UMTRCA and the Nuclear Regulatory Commission (NRC)

Under the statute, the NRC is authorized to regulate special nuclear material, source material, and byproduct material.<sup>152</sup> "Special nuclear material" refers to fissionable material, such as reactor fuel.<sup>153</sup> "Source material" is defined as:

(1) Uranium, thorium, or any other material which is determined by the Commission pursuant to the provisions of section 2091 of this title to be source material; or (2) ores containing one or more of the foregoing materials, in such concentration as the Commission may by regulation determine from time to time.<sup>154</sup>

Finally, "byproduct material," is defined as:

(1) any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material, and (2) the tailings or wastes produced by the extraction or concentration of uranium or thorium from

<sup>147</sup> 42 U.S.C. § 7901 (2006); *Id.* § 2014.

<sup>148</sup> 42 U.S.C. § 7911-7925 (2006).

<sup>149</sup> *Id.* § 2014 (active mill sites are subject to various provisions in the AEA and the UMTRCA, especially 42 U.S.C. § 2111(a) (2006) regarding licensing requirements).

<sup>150</sup> *Kerr-McGee Chem. Corp. v. U.S. Nuclear Regulatory Comm'n*, 903 F.2d 1, 8 (D.C. Cir. 1990).

<sup>151</sup> 10 C.F.R. Pt. 40 App. A. (2009).

<sup>152</sup> See 42 U.S.C. § 2021(a) (2006).

<sup>153</sup> *Id.* § 2014(aa).

<sup>154</sup> *Id.* § 2014(z) (clause (2) refers to raw materials or ores above a certain concentration of uranium deemed important to the NRC); see also U.S. NRC, Source Material, <http://www.nrc.gov/materials/srcmaterial.html> (last visited Mar. 30, 2010) (in addition to ores, another example of source material is depleted uranium from the enrichment process).

any ore processed primarily for its source material content.<sup>155</sup>

The "uranium fuel cycle" starts with milling of uranium ore and continues through the use of uranium in nuclear power plants and disposal after use.<sup>156</sup> Mining operations are specifically excluded.<sup>157</sup> ISL mining/milling is regulated by the NRC, but appears unlikely to be used at Coles Hill.<sup>158</sup>

In summary, authority to regulate mining and milling is split: the states regulate uranium mining, and the NRC regulates mill tailings.

#### E. The Agreement State Program

The Atomic Energy Act allows for the creation of agreements between the states and the NRC whereby the agency discontinues its regulatory authority and gives to the Agreement State the ability to license and regulate certain materials.<sup>159</sup>

Under this arrangement, a state may enter into a formal agreement with the NRC to assume regulatory control over milling, and the NRC may delegate any of its licensing and regulating authority over byproduct materials, source materials, and special nuclear materials "in quantities not sufficient to form a critical mass."<sup>160</sup>

To become an Agreement State, the State must have a regulatory program in place that meets NRC requirements and is "adequate to protect the public health and safety with respect to the materials within the State covered by the proposed agreement."<sup>161</sup> NRC also requires

<sup>155</sup> 42 U.S.C. § 2014(e) (2006) (the definition of "byproduct material" was amended in UMTRCA to include the previously unregulated elements of mill tailings and waste under the regulation of the NRC).

<sup>156</sup> See U.S. NRC, Uranium Recovery, <http://www.nrc.gov/materials/uranium-recovery.html> (last visited Mar. 29, 2010).

<sup>157</sup> See 40 C.F.R. § 190.02 (b) (2009).

<sup>158</sup> Mastilovic, *supra* note 101.

<sup>159</sup> 42 U.S.C. § 2021(b)(1)-(3) (2006); see also 42 U.S.C. § 2021(c)(1)-(4) (the NRC cannot delegate certain regulatory powers to a state: (1) construction and operation of production or utilization facility or uranium enrichment facility; (2) the export or import of byproduct, source, or special nuclear material, or production or utilization facility; (3) the disposal into the ocean of byproduct, source, or special nuclear waste, and (4) the disposal of such other byproduct, source, or special nuclear material as the Commission determines should not be disposed without a license from the Commission).

<sup>160</sup> 42 U.S.C. § 2021(b) (2006).

<sup>161</sup> *Id.* § 2021(d)(2); see also U.S. NRC, Agreement State Program, <http://www.nrc.gov/about-nrc/state-tribal/agreement-states.html> (last visited Mar. 28, 2010).

[C]ompliance with standards which shall be adopted by the State for the protection of the public health, safety, and the environment from hazards associated with such material which are *equivalent, to the extent practicable, or more stringent than*, standards adopted and enforced by the Commission for the same purpose, including requirements and standards promulgated by the Commission and the Administrator of the Environmental Protection Agency.<sup>162</sup>

The NRC must review the application of a prospective Agreement State to determine that all applicable federal standards and requirements will be met by the mills in the state. Currently, Arizona, Colorado, New Mexico, Texas, and Utah have Agreement State status for the licensing and disposal of uranium mill tailings waste.<sup>163</sup> In Non-Agreement States, such as Montana, South Dakota, and Wyoming, the NRC regulates the mill tailings.<sup>164</sup> In all cases, the states oversee mining activities.

Virginia became a partial Agreement State in 2009, in regard to source material, special nuclear material and all byproduct materials *except* for uranium mill tailings.<sup>165</sup> Because Virginia has the uranium mining moratorium in place, no regulations for milling exist. However, in its 1985 Report, the Virginia Coal and Energy Commission recommended that if the General Assembly were to lift the ban on uranium mining, it should apply for Agreement State status to regulate milling.<sup>166</sup>

The NRC monitors Agreement State programs periodically. Agreement State status is subject to termination or suspension, after reasonable notice and a hearing, on the initiative of either the NRC or the governor, if required to protect the public health and safety, or if the state has been found in non-compliance with Agreement State requirements.<sup>167</sup> In the case of an emergency, in

<sup>162</sup> 42 U.S.C. § 2021(o)(2) (emphasis added); see also 10 C.F.R. pt. 40, app. A: § 150.31 (2009).

<sup>163</sup> See U.S. NRC, Office of Federal and State Materials and Environmental Management Programs, Agreement and Non-Agreement States, <http://nrc-stp.ornl.gov/> (last visited Apr. 8, 2010) (the scope of Agreement State status varies, as some Agreement States listed, such as Virginia, do not have Agreement State status for uranium mining and milling).

<sup>164</sup> See *id.* (showing Montana, South Dakota, and Wyoming do not have Agreement State status).

<sup>165</sup> U.S. NRC, AGREEMENT BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION AND THE COMMONWEALTH OF VIRGINIA FOR THE DISCONTINUANCE OF CERTAIN COMMISSION REGULATORY AUTHORITY (2009), available at <http://nrc-stp.ornl.gov/special/regs/vaagreements.pdf>.

<sup>166</sup> C&E REPORT, *supra* note 23, at 10.

<sup>167</sup> 42 U.S.C. § 2021(j)(1) (2006).

which the state has failed to act within a reasonable period of time, the program may be temporarily suspended without any form of process.<sup>168</sup>

## F. The National Environmental Policy Act (NEPA)

### 1) NEPA Requirements for the NRC

Under the National Environmental Policy Act, an agency must perform an environmental impact statement (EIS), when there is a "major Federal action significantly affecting the quality of the human environment."<sup>169</sup> The NRC has developed regulations specifically implementing NEPA, which articulate when an NRC action is likely to require an EIS, an environmental assessment, or be exempted by a categorical exclusion to NEPA.<sup>170</sup> Under these regulations, an EIS is required before granting an NRC license for uranium milling.<sup>171</sup>

Under current regulations, the NRC is not required to conduct an EIS on the admittance of a state into the Agreement State program; in fact, NRC review of an application for Agreement State status as well as the NRC's discontinuance of that status are categorically excluded from NEPA.<sup>172</sup>

However, the NRC's EIS requirements include a provision that for "[a]ny other action which the Commission determines is a major Commission action significantly affecting the quality of the human environment . . . the Commission may, in *special circumstances*, prepare an environmental impact statement on an action covered by a categorical exclusion."<sup>173</sup> This appears to allow the NRC to require an EIS for an Agreement State decision under undefined but special conditions.

### 2) Agreement State Environmental and Procedural Requirements

Although the Agreement State decision is not subject to an EIS, UMTRCA requires that states have standards "which are *equivalent, to the extent practicable, or more stringent than*, standards adopted and enforced by the Commission for the same purpose, including requirements and standards promulgated by the Commission and the Administrator of the Environmental Protec-

<sup>168</sup> *Id.* § 2021(j)(2).

<sup>169</sup> *Id.* § 4332(2)(c).

<sup>170</sup> 10 C.F.R. § 51.20 (2009).

<sup>171</sup> *Id.* § 51.20(b)(8).

<sup>172</sup> *Id.* § 51.22(c)(4). This provision has never been challenged.

<sup>173</sup> *Id.* § 51.20(b)(14) (emphasis added).

tion Agency. . . ."<sup>174</sup> The NRC's NEPA regulations thus act as a floor for a state's regulatory program.<sup>175</sup>

Regardless of who issues the license, citizens must be provided "an opportunity, after public notice, for written comments and a public hearing, with a transcript;" "an opportunity for cross examination;" and "a written determination which is based upon findings included in such determination and upon the evidence presented during the public comment period and which is subject to judicial review."<sup>176</sup> In addition, whenever a uranium mill site would have "a significant impact on the human environment," the Agreement State must prepare a "written analysis . . . of the impact of such license, including any activities conducted thereto, on the environment."<sup>177</sup> Because the NRC has determined that mills have a significant impact on the environment, such environmental review would be required in each licensing case.<sup>178</sup> This written analysis must be made available to the public in advance of the licensing proceeding,<sup>179</sup> which includes a public comment period and public hearing.<sup>180</sup> Additionally, no major construction activity may commence before compliance with the environmental review is completed.<sup>181</sup>

The written environmental analysis must include:

- (i) an assessment of the radiological and nonradiological impacts to the public health of the activities to be conducted pursuant to such license;
- (ii) an assessment of any impact on any waterway and groundwater resulting from such activities;
- (iii) consideration of alternatives, including alternative sites and engineering methods, to the activities to be conducted pursuant to such license; and
- (iv) consideration of the long-term impacts, including decommissioning, decontamination, and reclamation impacts, associated with activities to be conducted pursuant

<sup>174</sup> 42 U.S.C. § 2021(o)(2) (2006) (emphasis added).

<sup>175</sup> Ronald H. Rosenberg, *Uranium Mining and Milling in Virginia: An Analysis of Regulatory Choice*, 4 VA. J. NAT. RESOURCES L. 81, 108 (1984).

<sup>176</sup> 42 U.S.C. § 2021(o)(3)(A)(i)-(iii) (2006).

<sup>177</sup> *Id.* § 2021(o)(3)(C).

<sup>178</sup> 10 C.F.R. § 51.20(b)(8) (2009).

<sup>179</sup> 42 U.S.C. § 2021(o)(3)(C) (2006).

<sup>180</sup> *Id.* § 2021(o)(3)(A)(i)-(iii).

<sup>181</sup> *Id.* § 2021(o)(3)(D).

to such license, including the management of any byproduct material . . . .<sup>182</sup>

Since Virginia currently has no comparable environmental review process, this Agreement State environmental process would require additional guidelines, funding, expertise, staff, and other resources to be consistent with the federal EIS requirements.

#### G. *The Role of the EPA in the Regulation of Uranium Mining and Milling*

UMTRCA establishes the NRC as sole regulator of uranium mill tailings, but it also directs the EPA to promulgate:

[S]tandards of general application for the protection of the public health, safety, and the environment from radiological and nonradiological hazards associated with the processing and with the possession, transfer, and disposal of byproduct material . . . at sites at which ores are processed primarily for their source material content or which are used for the disposal of such byproduct material.<sup>183</sup>

Thus, the EPA must set environmental standards for active uranium milling facilities, as well as inactive mills and tailings depository sites.<sup>184</sup> However, the EPA's role is mostly limited to setting the standards; the NRC retains the responsibility of implementing these standards.<sup>185</sup> Pursuant to this authority, the EPA has promulgated standards for: 1) control of residual radioactive materials from inactive uranium processing sites; 2) cleanup of land and buildings contaminated with residual radioactive materials from inactive uranium processing sites; 3) management of uranium byproducts materials; and 4) management of thorium byproduct materials.<sup>186</sup>

The EPA is also involved in regulation of conventional mining as well as milling through water and air quality standards for uranium in the Clean Water Act, Clean Air Act, and the Safe Drinking

<sup>182</sup> *Id.* § 2021(o)(3)(C)(i)-(iv) (emphasis added).

<sup>183</sup> *Id.* § 2022(b)(1).

<sup>184</sup> *Id.* § 2022(a) (concerning inactive sites).

<sup>185</sup> See *Waste Action Project v. Dawn Mining Co.*, 1996 U.S. Dist. Lexis 22268, 8 (E.D. Wash. Aug. 30, 1996) (discussed *infra*).

<sup>186</sup> 40 C.F.R. pt. 192 subpts. (A),(B),(D),(E) (2009) ("Standards for Cleanup of Land and Buildings Contaminated with Residual Radioactive Materials from Inactive Uranium Processing Sites").

Water Act.<sup>187</sup> While the Resource Conservation and Recovery Act (RCRA) does not apply to uranium, any other hazardous materials created by mining may be subject to RCRA's permitting and management guidelines.<sup>188</sup> Finally, the EPA is studying the problems of technologically enhanced naturally occurring radioactive material, in advance of possible regulation.<sup>189</sup>

### 1) Clean Water Act

Under Section 301 of the CWA, the discharge of any pollutant into waters of the United States requires a permit under the National Pollutant Discharge Elimination System (NPDES) program administered by EPA.<sup>190</sup> While, technically, uranium could be considered a pollutant, courts have strictly upheld the division of responsibility between the EPA and the NRC dictated by UMTRCA. In *Waste Action Project v. Dawn Mining Corp.*, the Ninth Circuit rejected the argument that the EPA retains authority to regulate mill tailings, determining that materials regulated by the NRC are not within the scope of the CWA.<sup>191</sup> Following this case, EPA updated its regulations to reflect that anything "covered by the Atomic Energy Act . . . encompassed in its definition of source, byproduct, or special nuclear materials" is excluded from CWA regulation.<sup>192</sup>

While the EPA cannot use the CWA to regulate uranium and other chemical pollutants covered under UMTRCA, it establishes standards for the concentrations of uranium and other chemicals in the wastewater discharged from mines and milling facilities.<sup>193</sup> Applicable effluent limitations standards for mining operations

<sup>187</sup> Discussed *infra*. CERCLA has been applied to inactive Uranium mines and could be applied to active Uranium milling facilities, although EPA has deferred to NRC on sites under NRC license.

<sup>188</sup> See 42 U.S.C. § 6903(27) (2006) (defining "solid waste," including "other discarded material . . . resulting from industrial, commercial, mining," but excluding "source, special nuclear, or byproduct material as defined by the [AEA]"); 42 U.S.C. § 6907 (2006) (establishing a requirement for EPA solid waste management information and guidelines).

<sup>189</sup> U.S. Environmental Protection Agency, About TENORM, <http://www.epa.gov/rpdweb00/tenorm/about.html> (last visited Mar. 28, 2010).

<sup>190</sup> 33 U.S.C. § 1342 (2006).

<sup>191</sup> 42 U.S.C. § 2022(e) (2006) ("Nothing in [the Atomic Energy Act] applicable to byproduct material . . . shall affect the authority of the [NRC] Administrator under the . . . [Clean Water Act]."); *Waste Action Project v. Dawn Mining Corp.*, 137 F.3d 1426, 1429 (9th Cir. 1998).

<sup>192</sup> 40 C.F.R. § 122.2 (2009) (excluding materials regulated under the AEA from the definition of "pollution").

<sup>193</sup> For open pit and underground mines a four milligram per liter maximum of uranium for any one day and a thirty-day average of two milligrams per liter. 40 C.F.R. § 440.32(a)

vary based on whether the facility is "previously existing" or new, as discussed below.<sup>194</sup>

Existing conventional mines and mills are subject to the standard of "best practicable control technology" (BPT), with specific effluent limitations.<sup>195</sup> New mines, such as those that could potentially operate in Virginia, must comply with the New Source Performance Standard (NSPS) of "Best Available Demonstrated Technology" (BADT),<sup>196</sup> and BADT for milling operations is more stringent: "there shall be no discharge of process wastewater to navigable waters from mills using the acid leach, alkaline leach or combined acid and alkaline leach process for the extraction of uranium . . ."<sup>197</sup> In promulgating these regulations, the agency noted that eighteen of nineteen existing mills do not discharge wastewater.<sup>198</sup>

Thus, a new operation in Virginia would have to comply with the stricter BADT standard, including the "no discharge" requirement for mills.<sup>199</sup> However, EPA regulations allow an exception to this requirement for mills in wet climates.<sup>200</sup> The "storm exception" provides that in the event annual precipitation exceeds annual evaporation, the treatment facility may discharge a volume of water equivalent to that difference, subject to applicable effluent concentration limits.<sup>201</sup>

When regulations were developed, industry complained that a "no discharge" standard would be harder for mills in high rainfall areas.<sup>202</sup> In response, the EPA noted that "we know of no plans for construction of new mills in non-arid areas, although some firms have conducted exploration in such areas. Should any new mills locate in areas of high net precipitation, they can take advantage of the net precipitation provision and the storm exemption."<sup>203</sup>

This would be a critical issue in Virginia. As Elizabeth Haskell noted in her 1985 dissent to the conclusions of the Uranium

(2009). Part (b) of the regulation applies to ISL mining and sets a standard for radon-226, a product of uranium mining. *Id.* § 440.32(b).

<sup>194</sup> *Id.* §§ 440.32-.34.

<sup>195</sup> *Id.* § 440.32.

<sup>196</sup> *Id.* § 440.34(a) (setting out effluent limitations for discharges from new conventional mines).

<sup>197</sup> *Id.* § 440.34(b)(1).

<sup>198</sup> 47 Fed. Reg. 54,598, 54,602 (Dec. 3, 1982) (to be codified at 40 C.F.R. pt. 440).

<sup>199</sup> 40 C.F.R. § 440.34(b)(1) (2009).

<sup>200</sup> *Id.* § 440.34(b)(2).

<sup>201</sup> *Id.* §§ 440.34(a), (b)(2).

<sup>202</sup> 47 Fed. Reg. 54,598, 54,602 (Dec. 3, 1982) (to be codified at 40 C.F.R. pt. 440).

<sup>203</sup> *Id.*

Administrative Group, Virginia has high precipitation and low evaporation rates.<sup>204</sup> Given Virginia's wet climate, the storm exemption allowing for discharges could make VUI's proposed mill the first new facility in the country legally to discharge polluted wastewater during a storm event.<sup>205</sup>

## 2) *Safe Drinking Water Act*

In addition to the CWA regulations of industrial wastewater discharges to surface waters from uranium mines and mills, the SDWA, which primarily regulates public water systems, would limit the amount of uranium that can be present in drinking water. The SDWA sets both unenforceable aspirational goals, in the form of "Maximum Contaminant Level Goals" (MCLGs) and enforceable Maximum Contaminant Levels (MCLs).<sup>206</sup> The aspirational MCLG for uranium in drinking water is zero.<sup>207</sup> While the enforceable MCL is thirty micrograms per liter, the World Health Organization has recommended two micrograms per liter.<sup>208</sup> The standards are enforceable against public water systems, and if a public drinking water source were to become contaminated, the water system would be liable for cleaning it up or finding a new source.<sup>209</sup> This has led the City of Virginia Beach to commission a two-part study to determine the risks of uranium mining upstream from its drinking water.<sup>210</sup>

Under the SDWA, the EPA has no authority over individual private groundwater wells, and the Virginia Department of Health is authorized to deal with private wells under state law and regulations.<sup>211</sup>

<sup>204</sup> C&E REPORT, *supra* note 23, at 21-27.

<sup>205</sup> *Id.*

<sup>206</sup> 42 U.S.C. §300f, §300g-1(a),(b) (Standards); *id.* § 300g-1(b)(4) (Goals and Standards).

<sup>207</sup> 40 C.F.R. § 141.55(4) (2009).

<sup>208</sup> *Id.* § 141.66(e); *see also* 40 C.F.R. § 141.66(b) (2009); Doug Brugge, Address at the Uranium Symposium, Richmond, Va. (Mar. 11, 2010); Press Release, Southern Envtl. Law Ctr., World Experts on Uranium Mining Featured at Richmond Forum (Mar. 11, 2010), available at [http://www.southernenvironment.org/newsroom/press\\_releases/world\\_experts\\_on\\_uranium\\_mining\\_featured\\_at\\_richmond\\_forum/](http://www.southernenvironment.org/newsroom/press_releases/world_experts_on_uranium_mining_featured_at_richmond_forum/). The MCL for combined radium -226 and -228 is 5 pci/l.

<sup>209</sup> *See* 42 U.S.C. §§ 300g-2(a)(6), 300g-3(2) (2006).

<sup>210</sup> *See* Elmes, *supra* note 84.

<sup>211</sup> *See* VA. CODE ANN. §§ 32.1-176.4, 176.5 (2009); 12 VA. ADMIN. CODE § 5-630-10 *et seq.* (2010).

## 3) *Clean Air Act*

In the regulation of air quality, the EPA steps into an area the NRC does not regulate through the EPA's National Emission Standards for Hazardous Air Pollutants program (NESHAPs). Under Section 112 of the CAA, the EPA must establish emissions standards for each regulated pollutant,<sup>212</sup> including radionuclides and radon. These standards may vary depending on whether the source is considered a "major source" or "area source" (determined by the amount of pollution generated).<sup>213</sup> The emission standard, "Maximum Achievable Control Technology" (MACT), includes both technology- and emission-based rules.<sup>214</sup> However, the EPA is not required to promulgate standards for radionuclide emissions from mills licensed by the NRC as long as the EPA decides that NRC regulations provide for an ample margin of safety to protect the public health; states may promulgate more stringent standards.<sup>215</sup> The EPA's regulations also apply to underground mines.<sup>216</sup>

The hazardous air pollution program is operated and enforced primarily through Title IV operating permits issued by the EPA or states,<sup>217</sup> and the EPA has delegated the authority to operate the program to Virginia.<sup>218</sup>

Under the CAA, the EPA has promulgated several regulations on emissions from conventional mining and milling operations. Subpart B of the NESHAPs regulations addresses radon-222 emissions from underground uranium mines, and limits the emission of radon-222 to ensure that no member of the public receives an effective dose of more than ten millirems (mrem) per year.<sup>219</sup> This limitation applies to active underground mines with 10,000 tons per year or more of ore production or 100,000 tons of ore production over the lifetime of the mine.<sup>220</sup> Underground mine operators are

<sup>212</sup> 42 U.S.C. § 7412(b)(1),(d) (2006); *see also* 40 C.F.R. § 61.01 (2009).

<sup>213</sup> 42 U.S.C. § 7412(a)(1)-(2) (2006).

<sup>214</sup> *Id.* § 7412(d)(3).

<sup>215</sup> *Id.* § 7412(d)(9); *see also id.* § 7416 ("[S]uch state . . . may not adopt or enforce any emission standard or limitation which is less stringent than the standard or limitation under such . . . section.").

<sup>216</sup> 40 C.F.R. § 61.22 (2009).

<sup>217</sup> *Id.* § 61.02.

<sup>218</sup> *Id.* § 61.04(b)(VV).

<sup>219</sup> *Id.* § 61.22. The millirem (mrem) is a measure of absorbed radiation; as a standard of comparison, a single diagnostic x-ray produces 70 mrem/yr. Georgia State University, Meet the Millirem, <http://hyperphysics.phy-astr.gsu.edu/HBASE/NucEne/radexp.html> (last visited Apr. 8, 2010).

<sup>220</sup> 40 C.F.R. § 61.20 (2009).

required to monitor or demonstrate compliance through a computer model.<sup>221</sup> Subpart W applies to radon emissions from mill tailings: Radon-222 emissions from existing mill tailings piles must be equal to or less than twenty pico curies per square meter per second (pCi/(m<sup>2</sup>-sec)).<sup>222</sup> Further, pre-construction approval is required for new tailings impoundments or modifications.<sup>223</sup> Best practices for construction and operation must be used. A new tailings impoundment must conform to one of two practices: 1) phased disposal in lined tailings impoundments that are no more than forty acres in area with no more than two impoundments in operation at any one time; or 2) continuous disposal of tailings so that tailings are de-watered and immediately disposed with no more than ten acres uncovered at any time.<sup>224</sup> Owners and operators of these facilities must test emissions and report to the EPA annually.<sup>225</sup> The EPA is currently reviewing Subpart W requirements for possible revision.<sup>226</sup>

#### 4) Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)

TENORM is created when naturally-occurring radioactive materials in rocks, soil, water, or minerals are "concentrated or exposed to the accessible environment as a result of human activities, such as manufacturing, mineral extraction, or water processing."<sup>227</sup> Overburden is the rock and soil covering a deposit of ore that is removed during surface mining.<sup>228</sup> Because overburden is not classified as source material or tailings, it is not regulated under UMTRCA, but in some cases, it may be disposed of with regulated

tailings.<sup>229</sup> Due to the large amount of this material produced by uranium mining and milling, up to thirty pounds of overburden for every pound of ore has been produced by open pit mines (underground mines ranging from 20:1 to 1:1).<sup>230</sup> TENORM is of particular concern to the EPA.<sup>231</sup> In the late 1990s, the EPA commissioned a National Academy of Sciences report on the EPA's then-existing guidance on TENORM.<sup>232</sup> Pursuant to the recommendations in that report, the EPA studied the TENORM issue further, and conducted an advanced study of TENORM waste from uranium mining.<sup>233</sup> To date, however, no regulations have been developed. Because so much waste is created from uranium mining, this unregulated material represents a large gap in the regulatory process.

#### 5) Resource Conservation and Recovery Act

RCRA is the EPA's main regulatory tool for managing hazardous and nonhazardous solid wastes. However, because "source material, special nuclear material, and byproduct material" are explicitly excluded from the definition of "solid waste" in RCRA,<sup>234</sup> uranium mill tailings are not regulated under RCRA.<sup>235</sup> However, if other solid wastes are created in the mining or other "industrial" operations, such as milling, RCRA would apply.<sup>236</sup>

#### H. In Situ Leachate Operations

VUI says ISL is unlikely to be used at Coles Hill.<sup>237</sup> However, as a new technology supported by the National Mining Association

<sup>221</sup> *Id.* § 61.23.

<sup>222</sup> *Id.* § 61.252(a) (2009); see U.S. Army Corps of Engineers, How Big is a Picocurie?, <http://www.lrb.usace.army.mil/fusrap/docs/fusrap-fs-picocurie.pdf> (last visited Apr. 8, 2010) (defining a pico curie as the amount of radioactivity present in one trillionth of one gram of pure radium).

<sup>223</sup> 40 C.F.R. § 61.07 (2009).

<sup>224</sup> *Id.* § 61.252(b).

<sup>225</sup> See U.S. Environmental Protection Agency, Radiation Protection, Subpart W: Operating Uranium Mill Tailings, <http://www.epa.gov/rpdweb00/neshaps/subpartw/index.html> (last visited Apr. 8, 2010).

<sup>226</sup> See *Citizens Against Toxic Waste v. Jackson*, No. 08-cv-1787 (D. Colo. 2009) (the EPA stating in a settlement agreement that it has commenced review of Subpart W), available at <http://www.epa.gov/radiation/docs/neshaps/subpart-w/settlementagreement.pdf>.

<sup>227</sup> U.S. ENVTL. PROT. AGENCY, Technical Report on Technologically Enhanced Naturally Occurring Radioactive Materials from Uranium Mining, Volume 1: Mining and Remediation Background V (2008), available at <http://www.epa.gov/radiation/tenorm/pubs.html> [hereinafter "U.S. EPA, TENORM"].

<sup>228</sup> *Id.* at A1-9.

<sup>229</sup> *Id.* at ES-1 to ES-2.

<sup>230</sup> *Id.* at 3-6.

<sup>231</sup> *Id.* at 1-3.

<sup>232</sup> NAT'L RESEARCH COUNCIL, *supra* note 146.

<sup>233</sup> EPA, TENORM, *supra* note 227.

<sup>234</sup> See 42 U.S.C. § 6903 (2006) (defining "solid waste" as regulated under the RCRA as excluding "source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954").

<sup>235</sup> See 42 U.S.C. § 2014(e) (2006) (the AEA's definition of "byproduct material" was amended in UMTRCA to include uranium mill tailings and waste); *Hardrock Mining: Issues Relating to Abandoned Mine Lands and Uranium Mining* 9, 110th Cong. (Mar. 12, 2008) (statement of Fletcher T. Newton, Executive Vice President, Uranium One, Inc., S. Energy and Natural Res. Comm.), available at [http://energy.senate.gov/public\\_files/NewtonNMATestimony031208.pdf](http://energy.senate.gov/public_files/NewtonNMATestimony031208.pdf) (stating uranium mill tailings and waste are specifically exempted from regulation by the EPA under the RCRA, as they are considered "11e.(2) byproduct material").

<sup>236</sup> See 42 U.S.C. § 68903(27) (2006) (defining "solid waste" as including "discarded materials" from "industrial, commercial, mining, and agricultural operations").

<sup>237</sup> Mick Mastilovic, *supra* note 101.

and others,<sup>238</sup> ISL should not be overlooked as a potential technique in Virginia. Because ISL operations mine and mill in one step, they are regulated as milling by the NRC or by a state under the Agreement State program.<sup>239</sup>

When the NRC issues a permit, NEPA requires that an Environmental Impact Statement (EIS) be conducted.<sup>240</sup> The NRC's final Generic EIS, issued May 2009,<sup>241</sup> is applicable to all potential ISL facilities in four regions of the country for 2008-2010.<sup>242</sup> Because the GEIS fails to identify any major federal action since no specific ISL facility is proposed, the Natural Resources Defense Council (NRDC) urged the NRC to withdraw the GEIS due to the "inherently site specific" environmental impacts of ISL on groundwater.<sup>243</sup>

ISL operations are required to obtain NPDES stormwater discharge permits under the CWA for materials not covered by UMRCA, based on effluent limitations set out in regulations.<sup>244</sup> Existing ISL facilities are also subject to the standard of best practicable control technology (BPT), with specific effluent limitations.<sup>245</sup> In contrast, new ISL facilities must comply with the New Source Performance Standard (NSPS) under the stricter Best Available Demonstrated Technology (BADT) standard.<sup>246</sup> BADT prohibits "discharge of process wastewater to navigable waters."<sup>247</sup> Like other milling facilities, ISL operations also have a "storm exception" allowing for discharges in significant storm events.<sup>248</sup> Under these conditions, an ISL facility could discharge additional

<sup>238</sup> See *Hardrock Mining*, *supra* note 235, at 15-23.

<sup>239</sup> See 42 U.S.C. §§ 2014(z), 2021(b) (2006).

<sup>240</sup> See 10 C.F.R. § 51.20(b)(8) (2009).

<sup>241</sup> U.S. NRC, GENERIC ENVIRONMENTAL IMPACT STATEMENT FOR IN SITU LEACH URANIUM MILLING FACILITIES (2009), available at <http://www.nrc.gov/materials/uranium-recovery/geis.html>.

<sup>242</sup> *Id.* at xxxviii (listing the four regions as Wyoming West Uranium Milling Region, Wyoming East Uranium Milling Region, Nebraska-South Dakota-Wyoming Uranium Milling Region, and the Northwestern New Mexico Milling Region).

<sup>243</sup> Letter from Geoffrey H. Fettus & Christopher E. Paine, Natural Resources Defense Council, to Chief of Rules Review and Directives Branch, U.S. NRC (Nov. 30, 2007) (on file with author).

<sup>244</sup> 40 C.F.R. §§ 440.30-.34 (2009).

<sup>245</sup> *Id.* § 440.32(b).

<sup>246</sup> *Id.* § 440.34.

<sup>247</sup> *Id.* § 440.34(b).

<sup>248</sup> See *Id.* § 440.34(b)(2) (providing that in the event annual precipitation exceeds annual evaporation, the ISL facility may discharge a volume of water equivalent to that difference, subject to applicable effluent concentration limits).

wastewater as long as it did not violate the specific effluent limitations.<sup>249</sup>

ISL operations also are subject to specific regulations under the Safe Drinking Water Act's Underground Injection Control Program (UIC), which regulates groundwater standards more stringently in the context of ISL because of the increased potential to contaminate groundwater.<sup>250</sup> The regulations apply when there is an Underground Source of Drinking Water (USDW), for example an aquifer or part of an aquifer.<sup>251</sup> A USDW is defined as either: 1) an aquifer that currently supplies a public water system; or 2) contains sufficient quantity of ground water to supply a public water system and (a) currently supplies drinking water for human consumption or (b) contains fewer than 10,000 milligrams per liter of total dissolved solids and is not an "exempted aquifer."<sup>252</sup> In other words, the regulation attempts to protect both an existing public water system and a groundwater system that is capable of providing drinking water.

States can opt to have their own UIC regulatory authority through a program similar to the NRC's Agreement State program. As long as they demonstrate certain minimum requirements, states can apply to have "primacy" and oversee underground injections.<sup>253</sup> Because Virginia has not sought primacy, the EPA oversees any underground injections in the Commonwealth.<sup>254</sup>

#### IV. DECONTAMINATING AND DECOMMISSIONING URANIUM MINES AND MILLS

##### A. *The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)*

CERCLA, or "Superfund," requires the EPA to create a list of hazardous waste sites in the nation and a framework for cleaning them up.<sup>255</sup> The EPA current lists 1,279 Superfund sites on its

<sup>249</sup> *Id.* § 440.34(b)(2).

<sup>250</sup> *Id.* § 144.28.

<sup>251</sup> See *id.* § 144.1(g).

<sup>252</sup> *Id.* §§ 146.3-.5.

<sup>253</sup> *Id.* § 145.

<sup>254</sup> U.S. Environmental Protection Agency, UIC Program Primacy, <http://www.epa.gov/safewater/uic/primacy.html> (last visited Apr. 8, 2010).

<sup>255</sup> 42 U.S.C. § 9606 (2006).

National Priorities List,<sup>256</sup> thirty-one of which are located in Virginia.<sup>257</sup>

A 2002 Memorandum of Understanding (MOU) acknowledges that "EPA has generally deferred listing on the CERCLA National Priorities List (NPL) those sites that are subject to NRC's licensing authority, in recognition that NRC's actions are believed to be consistent with the CERCLA requirement to protect human health and the environment."<sup>258</sup> The MOU purports to reduce the duplicative authority that the EPA and the NRC share, where the "NRC will continue to ensure remediation of sites under its jurisdiction to a level that fully protects public health and safety."<sup>259</sup> When deciding whether to terminate a license, the NRC must consult with the EPA when radioactive ground water contamination exceeds the EPA's maximum contaminant levels under the SDWA.<sup>260</sup>

Because uranium mines are not subject to NRC authority, EPA has regulatory authority over them under CERCLA for hazardous waste sites. For example, the EPA has identified 15,000 mine locations in Western states with uranium occurrences.<sup>261</sup> It has listed only two uranium mining sites on the National Priorities List: Fremont National Forest Uranium Mines (also known as the White King/Lucky Lass Mines) in Oregon and the Midnite Mine in Washington.<sup>262</sup> Additionally, in the case of the Midnite Mine, the EPA has successfully sued the responsible parties to recover cleanup costs.<sup>263</sup>

The EPA in 2009 published a notice listing facilities within the hardrock mining industry as a priority for development of financial responsibility requirements, and it expects to propose a rule by

<sup>256</sup> Press Release, U.S. Envtl. Prot. Agency, EPA Adds Ten Hazardous Waste Sites to Superfund's National Priorities List (Mar. 2, 2010), available at <http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efvb85257359003fb69d/b065739662ab84c0852576da006ad3231?OpenDocument>.

<sup>257</sup> Virginia DEQ, Superfund, <http://www.deq.virginia.gov/waste/superfund.html> (last visited Apr. 8, 2010).

<sup>258</sup> U.S. EPA & U.S. NRC, MEMORANDUM OF UNDERSTANDING BETWEEN THE ENVIRONMENTAL PROTECTION AGENCY AND THE NUCLEAR REGULATORY COMMISSION, CONSULTATION AND FINALITY ON DECOMMISSIONING AND DECONTAMINATION OF CONTAMINATED SITES 2 (2002), available at <http://www.epa.gov/superfund/health/contaminants/radiation/mou.htm> (hereinafter "MOU").

<sup>259</sup> *Id.* at 1.

<sup>260</sup> *Id.* at 3.

<sup>261</sup> Abandoned Mine Lands, Portal, available at [http://www.abandonedmines.gov/wbd\\_um.html](http://www.abandonedmines.gov/wbd_um.html) (last visited Apr. 8, 2010).

<sup>262</sup> *Id.*

<sup>263</sup> *United States v. Newmont USA Ltd.*, 504 F.2d 1077 (E.D. Wash. 2007).

spring 2011.<sup>264</sup> Hardrock mining facilities are those which "extract, beneficiate or process metals," including uranium.<sup>265</sup>

## B. Conventional Uranium Mines

Because conventional uranium mines are largely under state, not federal, regulation, the states are in charge of any decommissioning regulations for mines. States have their own decommissioning regulations, like the State of New Mexico's policy on clean-up and reclamation.<sup>266</sup> If the EPA lists a contaminated mine site under CERCLA,<sup>267</sup> it would take a role in decommissioning the mine.

Based on the type of mine and specific state requirements, reclamation of underground mines is generally easier and cheaper, because they have few reclamation requirements: mine shafts and openings must be closed; overburden on the surface must be moved, contoured, covered with topsoil, and re-vegetated.<sup>268</sup> Reclamation for open pit mines can be much more costly. For example, the Rocky Mountain Energy Company in Wyoming reportedly spent approximately thirty-five million dollars on reclamation of pits in the Powder River Basin.<sup>269</sup> In addition, the company, which leased tribal lands in New Mexico for mining, paid the tribes forty-five million dollars for reclamation of two large open pit mines.<sup>270</sup> Returning the landscape to its original condition includes several steps. Pits must be filled and the land re-contoured to fit within the terrain, which can be achieved by either replacing overburden or by adding fill, replacing topsoil, and re-seeding.<sup>271</sup> Additional concerns arise if poor operating practices were used at the mine, such that groundwater contamination or radon gas, a decay product of uranium, could be released.<sup>272</sup>

<sup>264</sup> U.S. ENVTL. PROT. AGENCY, IDENTIFICATION OF PRIORITY CLASSES OF FACILITIES FOR DEVELOPMENT OF CERCLA SECTION 108(B) FINANCIAL RESPONSIBILITY REQUIREMENTS 1 (2009), available at <http://www.epa.gov/superfund/policy/financialresponsibility/index.html> and click on title at bottom of page.

<sup>265</sup> *Id.* at 3.

<sup>266</sup> *N.M. Court Rules Uranium Mines Covered by State Law Ensuring Cleanup*, AZ CENTRAL, Sept. 10, 2002, available at <http://www.wise-uranium.org/uregus03.html#NMMINSTLAW>.

<sup>267</sup> See 42 U.S.C. §§ 9605-09 (2006).

<sup>268</sup> U.S. EIA, DECOMMISSIONING OF U.S. URANIUM PRODUCTION FACILITIES DOE/EIA-0592 7 (1995), available at <http://tonto.eia.doe.gov/FTP/ROOT/nuclear/0592.pdf>.

<sup>269</sup> *Id.*

<sup>270</sup> *Id.*

<sup>271</sup> *Id.*

<sup>272</sup> Taryn Toro, *How to Close a Uranium Mine: Next Week Germany Takes on Full Responsibility for Decommissioning the Mines That Were Once the World's Third Largest Source of Uranium: The Challenges Are Enormous*, NEW SCIENTIST, June 22, 1991.

Utah has a Mined Land Reclamation Act requiring a reclamation plan when the original notice of intention to mine for uranium is filed.<sup>273</sup> Operators must also provide surety for the reclamation. The Division of Oil, Gas, and Mining determines "the amount of surety required, based upon the nature and extent of the proposed mining operation, and the magnitude and type of reclamation required."<sup>274</sup> Utah's reclamation guidelines require that operators minimize hazards to the public safety and welfare, and require operators to "seal any adits [horizontal passages to mines], remove all buildings and other debris, restore natural drainages so as not to harm the hydrological cycle, provide erosion control, redistribute disturbed topsoil and revegetate, and remove all 'deleterious materials.'"<sup>275</sup> Further, the Division of Oil, Gas, and Mining has significant discretion to determine what level of reclamation to require based upon the stated post-mining use.<sup>276</sup>

### C. Reclamation of Uranium Mills and ISL Operations

Unlike mines regulated by state law, UMTRCA governs the reclamation of uranium mills. Title I of UMTRCA charges the Department of Energy (DOE) with completing reclamation efforts at inactive uranium milling sites, where milling had ceased and the sites were no longer licensed by the NRC.<sup>277</sup> Under the Uranium Mill Tailings Remediation Action Project (UMTRAP), the DOE has been involved in activities at twenty-four inactive uranium mill tailings piles.<sup>278</sup>

(describing how in 1991, the Wismut mining company began decommissioning its six uranium mines in former East Germany. In addition to permeating local mines and the surrounding towns, radon gas led to radioactivity levels 500 times the maximum recommended dose).

<sup>273</sup> Brett T. Bunkall, *The Uranium Mining and Milling Industry in Utah*, 26 J. LAND RESOURCES & ENVTL. L. 375, 384 (2006).

<sup>274</sup> *Id.*

<sup>275</sup> *Id.* at 385.

<sup>276</sup> *Id.*

<sup>277</sup> U.S. NRC, Fact Sheet on Uranium Mill Tailings, <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/mill-tailings.html> (last visited Apr. 8, 2010).

<sup>278</sup> *Id.* Twenty-two of these sites were congressionally designated: Ambrosia Lake, New Mexico; Canonsburg, Pennsylvania; Durango, Colorado; Falls City, Texas; Grand Junction, Colorado; Green River, Utah; Gunnison, Colorado; Lakeview, Oregon; Lowman, Idaho; Maybell, Colorado; Mexican Hat, Utah; Monument Valley, Arizona; Naturita, Colorado; Rifle, Colorado (two sites); Riverton, Wyoming; Salt Lake City, Utah; Shiprock, New Mexico; Slick Rock, Colorado (two sites); and Tuba City, Arizona. 42 U.S.C. § 7912 (2006). Two more were added by DOE. Licenses for two conventional mill sites under Title 2 of UMTRCA were terminated and transferred to DOE. U.S. NRC, Fact Sheet, *supra* note 277.

Uranium mill sites licensed by the NRC after the enactment of UMTRCA in 1978 must also follow standards relating to decontamination, decommissioning and reclamation.<sup>279</sup> The EPA is vested with the overall authority for establishing environmental standards for the decommissioning of uranium production facilities, whereas the NRC oversees decommissioning.<sup>280</sup> Each license for a facility issued by the NRC must contain provisions regarding decontamination, decommissioning, and reclaiming the licensed facility.<sup>281</sup> Before the NRC issues a license, the operator must submit a decommissioning plan for approval.<sup>282</sup> Technical requirements are set out for handling uranium mill tailings and other materials and complying with required operational and management practices.<sup>283</sup>

Financial criteria are also established. Before operations commence, the operator must post surety to guarantee that funds are available to execute the decommissioning plan and reclaim the site.<sup>284</sup> The amount of surety required is determined using NRC-approved cost estimates of an NRC-approved plan for decontaminating and decommissioning the mill site to a level which allows unrestricted use of the areas, and reclamation of the waste tailings and/or waste areas in accordance with certain technical requirements.<sup>285</sup> These cost estimates must be based on amounts incurred if an independent contractor were hired to do the work.<sup>286</sup> This surety is in addition to, but may be combined with, a surety provided to other federal and/or state agencies in connection with the work at the site as long as a sufficient portion is allocated to reclamation.<sup>287</sup> The NRC annually revisits the surety mechanism to assure that sufficient funds would be available for completion of the reclamation plan if the work had to be completed by an independent contractor.<sup>288</sup> Upon termination of the license, a mini-

<sup>279</sup> 42 U.S.C. § 2113 (2006).

<sup>280</sup> See U.S. EIA, *supra* note 268, at viii. The EPA's standards for decommissioning are listed in 40 C.F.R. Pt. 192: "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings." The NRC's UMTRCA Title II regulations are set out in 10 C.F.R. pt. 40: "Domestic Licensing of Source Material."

<sup>281</sup> See 10 C.F.R. pt. 40 (2009).

<sup>282</sup> 42 U.S.C. § 2113; see also U.S. EIA, *supra* note 268, at viii.

<sup>283</sup> 10 C.F.R. pt. 40, App. A, § 1 (2009).

<sup>284</sup> 10 C.F.R. pt. 40, App. A, § 11 (2009).

<sup>285</sup> *Id.*

<sup>286</sup> *Id.*

<sup>287</sup> *Id.*

<sup>288</sup> *Id.*

num charge of \$250,000 must be paid by the operator to the NRC or state regulatory agency.<sup>289</sup>

The surety is kept in place until the NRC (or responsible state agency) has approved a release stating that the licensee has completed restoration and reclamation under UMTRCA standards.<sup>290</sup> After this satisfactory decommissioning, title to the reclaimed tailings area passes to either the DOE (or another federal agency designated by the President) or to the Agreement State in which it is located.<sup>291</sup> This federal or state agency is responsible for long-term monitoring and care of the site to "protect the public health, safety, and the environment" under a general license issued by the NRC.<sup>292</sup>

Uranium mill structures and equipment must be cleaned and decontaminated.<sup>293</sup> The structure and equipment may be buried along with the remaining mill tailings (those not reclaimed or moved to a different treatment site) in a tailings pile.<sup>294</sup> The mill site is then reseeded and re-vegetated.<sup>295</sup> More specific requirements are placed on the reclamation of tailings piles, which are geared towards reducing gamma radiation and preventing groundwater contamination.<sup>296</sup> The existence of tailings considerably increases the decommissioning cost of mill sites. Fifteen years ago, in 1995, the average decommissioning cost was \$14.1 million, \$7.7 million of which was for tailings reclamation, and \$2.3 million for groundwater restoration.<sup>297</sup> It is unclear what mechanisms, if any, are in place to guard against bankruptcy or catastrophic events.

Once the NRC finds that the decommissioning and reclamation have complied with its requirements and a satisfactory Long-Term Surveillance Plan (LTSP) is in place, the NRC will terminate the license to operate, and title to the mill site will pass to the DOE or an Agreement State for long-term custodial care.<sup>298</sup>

Because ISL operations operate underground, surface disturbance is kept to a minimum.<sup>299</sup> Consequently, the decommission-

<sup>289</sup> *Id.*

<sup>290</sup> U.S. EIA, *supra* note 268, at 6.

<sup>291</sup> See 10 C.F.R. § 40.28 (2009).

<sup>292</sup> *Id.* This long term monitoring and care is carried out under a long-term surveillance plan, with specific requirements listed under 10 C.F.R. § 40.27.

<sup>293</sup> U.S. EIA, *supra* note 268, at 11.

<sup>294</sup> *Id.*

<sup>295</sup> *Id.*

<sup>296</sup> *Id.*

<sup>297</sup> *Id.* at viii.

<sup>298</sup> 42 U.S.C. § 2113(b) (2006); 10 C.F.R. § 40.28 (2009).

<sup>299</sup> U.S. EIA, *supra* note 268, at viii.

ing of ISL operations thus far has been less expensive than that for conventional mills, with an average cost (in 1995) of \$7 million, of which forty percent was allocated to groundwater restoration, the primary area of concern in the ISL method.<sup>300</sup> The decommissioning process for ISL sites consists of three main steps: 1) plant dismantling and ground restoration; 2) wellfield restoration; and 3) groundwater restoration.<sup>301</sup> However, because ISL is relatively new, the long range impacts of ISL on groundwater and aquifers needs study and research.

After site remediation has been completed, the NRC may issue the Department of Energy (or other state or federal designated agency) a general license granting authority over the long-term care of the site under an LTSP.<sup>302</sup> The first such license was issued in 1993 for an inactive tailings site in Spook, Wyoming, and seventeen other sites have subsequently come under general licenses.<sup>303</sup> Thus, after the operation ceases, and remediation and reclamation are complete, the title to the mill and tailings disposal site at Coles Hill would pass to federal or state ownership.

#### D. History of Clean-up of Uranium Mines in the U.S.

In 2008, the U.S. Senate Committee on Energy and Natural Resources held oversight hearings on mining issues in the West, including uranium mining on public and private lands.<sup>304</sup>

Bill Brancard, director of Mining and Minerals Division, New Mexico Energy, Minerals and Natural Resources Department, spoke for New Mexico as well as the Interstate Mining Compact Commission.<sup>305</sup> While his comments focused on hardrock mining in general, he also specifically addressed uranium mining, stating that even though most of the sites predated the passage of UMTRCA, over fifty percent of uranium mines (137 of 259 mines) had no record of any reclamation and the estimated cleanup costs were at least \$50 million, not including funds for water quality

<sup>300</sup> *Id.*

<sup>301</sup> *Id.* at 33-36.

<sup>302</sup> 10 C.F.R. § 40.27 (2009).

<sup>303</sup> U.S. NRC, Fact Sheet, *supra* note 278; see also *supra* note 279 and accompanying text.

<sup>304</sup> *Issues Related to Abandoned Mine Lands and Uranium: Oversight Hearings on Hardrock Mining Before the S. Comm. on Energy and Natural Resources*, 110th Cong. (2008), available at [http://energy.senate.gov/public/index.cfm?Fuseaction=Hearings.Hearing&Hearing\\_ID=576bf0a1-bb72-435b-3d43-1ec215903dcf](http://energy.senate.gov/public/index.cfm?Fuseaction=Hearings.Hearing&Hearing_ID=576bf0a1-bb72-435b-3d43-1ec215903dcf).

<sup>305</sup> *Id.* at 7 (statement of Bill Brancard).

remediation, residential remediation or waste removal.<sup>306</sup> In 1999, the Energy Information Agency reported that the DOE had spent almost \$1.5 billion on remediation of uranium mill sites.<sup>307</sup>

The Government Accountability Office (GAO) testified at the 2008 Senate oversight hearing that a \$60.6 million gap existed between the amount the U.S. Bureau of Land Management (BLM) estimated for financial assurance requirements and the actual value in place for the plan operations for abandoned hardrock mines on land managed by the BLM.<sup>308</sup>

Counterbalancing criticism of uranium production, the National Mining Association (NMA) testified that the BLM has strengthened financial guarantee requirements for mining and exploration on its lands, and financial assurances now require financial guarantees to ensure that a third party would be able to conduct the reclamation.<sup>309</sup> The NMA also focused on ISL operations that the industry is promoting as the "new technology" replacing conventional mines and mills.<sup>310</sup> The NMA focus on ISL means that it recognizes the limits of conventional technologies: this should serve as a warning to the Commonwealth since recent discussion about Coles Hill centers on use of conventional methods.

Colorado newspapers reported that a uranium mill near Cañon City, Colorado – currently on the EPA's National Priorities List – leaked contaminated water to nearby groundwater; this was a catalyst for the Colorado legislature to enact legislation to require mill operators to comply with all clean-ups before receiving new permits and strengthening bonding requirements for clean up and decommissioning.<sup>311</sup>

VUI has responded to such environmental concerns that its facility will be more modern than facilities created before

UMTRCA.<sup>312</sup> VUI recently pointed to France's nuclear energy as a model for domestic energy production, and has compared a former mine in Bessines, France, with potential mining in Pittsylvania County in terms of rainfall, temperature, population density, and topography.<sup>313</sup> Critics have countered that this and other French mines are closed, and that in all French uranium mines where radiological surveys were made, researchers discovered environmental contamination and a lack of protection against health risks.<sup>314</sup>

## V. WHAT DOES THIS MEAN FOR VIRGINIA?

In February, 2010, the National Academy of Sciences announced that it had signed a contract with Virginia Tech for the Virginia Uranium Study.<sup>315</sup> The Academy will conduct the study through the Board on Earth Science and Resources' Committee on Earth Resources in collaboration with the Water Sciences and Technology Board.<sup>316</sup> The following are parameters for the scientific study<sup>317</sup>:

- 1) Assess the potential short- and long-term occupational and public health and safety considerations from uranium mining, milling, processing, and reclamation, including the potential human health risks from exposure to "daughter" products of radioactive decay of uranium.
- 2) Review global and national uranium market trends.
- 3) Identify and briefly describe the main types of uranium deposits worldwide including, for example, geologic characteristics, mining operations, and best practices.

<sup>312</sup> See, e.g., Virginia Uranium, Inc., Frequently Asked Questions, <http://virginiauranium.com/faqs.php#7> (last visited Mar. 21, 2010).

<sup>313</sup> *Commentary*, THE COLES HILL PROGRESS, *supra* note 54 at 1.

<sup>314</sup> Piedmont Environmental Council, Failed French Uranium Mining – A Model for Virginia to Emulate?, <http://www.pecva.org/anx/index.cfm/1.391.2734.0.html/Failed-French-Uranium-Mining-A-Model-for-Virginia-to-Emulate> (last visited Mar. 23, 2010) (reviewing BRUNO CHAREYRON, COMMISSION DE RECHERCHE ET D'INFORMATION INDEPENDANTES SUR LA RADIOACTIVITE, RADIOLOGICAL HAZARDS FROM URANIUM MINING (2007)).

<sup>315</sup> Tim Davis, *Uranium Study Gets Green Light*, CHATHAM STAR TRIB., Feb. 23, 2010, available at <http://www.wpcva.com/articles/2010/02/24/chatham/news/news50.txt>.

<sup>316</sup> National Academy of Science, Board on Earth Sciences and Resources, New Study: Uranium Mining in Virginia, <http://www.dels.nas.edu/besr/uranium.shtml> (last visited Mar. 23, 2010).

<sup>317</sup> *Id.*

<sup>306</sup> *Id.*

<sup>307</sup> U.S. EIA, REMEDIATION OF UMTRCA TITLE I URANIUM MILL SITES UNDER THE UMTRA PROJECT, SUMMARY TABLE: URANIUM ORE PROCESSED, DISPOSAL CELL MATERIAL, AND COST FOR REMEDIATION AS OF DECEMBER 31, 1999 (1999), available at <http://www.eia.doe.gov/cneaf/nuclear/page/umtra/title1sum.html>.

<sup>308</sup> *Information on Abandoned Mines and Value and Coverage of Financial Assurances on BLM Land: Oversight Hearings on Hardrock Mining Before the S. Comm. on Energy and Natural Resources*, 110th Cong. 29 (2008) (statement of Robin M. Nazzaro, Director, Natural Resources and Environment, GAO).

<sup>309</sup> *Id.* (statement of Fletcher T. Newton, Executive Vice President, Uranium One, Inc.).

<sup>310</sup> *Id.* at 14.

<sup>311</sup> Andy Koen & Bea Karnes, *Lawmakers Take Aim at Uranium Mills*, NEWS FIRST 5, Jan. 26, 2010, <http://www.newsfirst5.com/news/lawmakers-take-aim-at-Uranium-processors/>.

- 4) Analyze the impact of uranium mining, milling, processing, and reclamation operations on public health, safety, and the environment at sites with comparable geologic, hydrologic, climatic, and population characteristics to those found in the Commonwealth. Such analysis shall describe any available mitigating measures to reduce or eliminate the negative impacts from uranium operations.
- 5) Review the geologic, environmental, geographic, climatic, and cultural settings and exploration status of uranium resources in the Commonwealth of Virginia.
- 6) Review the primary technical options and best practices approaches for uranium mining, milling, processing, and reclamation that might be applicable within the Commonwealth of Virginia, including discussion of improvements made since 1980 in the design, construction, and monitoring of tailings impoundments ("cells").
- 7) Review the state and federal regulatory framework for uranium mining, milling, processing, and reclamation.
- 8) Review federal requirements for secure handling of uranium materials, including personnel, transportation, site security, and material control and accountability.
- 9) Identify the issues that may need to be considered regarding the quality and quantity of groundwater and surface water, and the quality of soil and air from uranium mining, milling, processing, and reclamation. As relevant, water and waste management and severe weather effects or other stochastic events may also be considered.
- 10) Assess the potential ecosystem issues for uranium mining, milling, processing, and reclamation.
- 11) Identify baseline data and approaches necessary to monitor environmental and human impacts associated with uranium mining, milling, processing, and reclamation.
- 12) Provide a non-technical summary of the report for public education purposes (for example, health and safety issues, inspection and enforcement, community right-to-know, emergency planning).

The Academy has also stated that "the study will not make recommendations about whether or not uranium mining should be permitted nor will the study include site-specific assessments."<sup>318</sup>

<sup>318</sup> *Id.*

Thus, it is clear that the Academy will not assess whether uranium production can be done in a manner that is safe for human health and the environment at this site.<sup>319</sup> According to the contract, it will report to the Coal and Energy Commission by December 1, 2011, with a pre-publication version of the Academy's work.<sup>320</sup> By early 2012, the Academy will publish a printed version of the final report with a nontechnical summary.<sup>321</sup> It is likely that hearings before the committee and subcommittee will be held in 2012 and thus that any legislative action would occur no earlier than the 2013 session of the General Assembly.

More immediately, the Uranium Subcommittee anticipates holding public hearings on the scope of a socioeconomic study, which it also hopes to commission.<sup>322</sup> Hopefully, the Academy's study, along with those by the City of Virginia Beach and the Danville Regional Foundation, and a statewide socio-economic study will inform the choices that ultimately state legislators will make in determining whether to lift the moratorium.

Although the Academy study is expected to be objective, its findings no doubt will be used by proponents and opponents. Scientists have raised questions about the use of science to promote the corporate interest versus reviewing science in the public interest. For example, one article notes:

Companies seeking to extract resources . . . have become a concern for affected communities. When a corporate industry walks into the neighborhood with their best researcher/technical expert and presents their view of research, . . . as safe or risk free, and that it will, in the long term, benefit their communities, there is a potential that the analysis is skewed to justify the company's interest. These companies often use the practice of "royalties" (small payments to show good faith), jobs, and other incentives to smooth the path to expropriation of these resources regardless of the disrup-

<sup>319</sup> Katie Whitehead, *National Academy Won't Answer Our Biggest Questions*, ALTAVISTA STAR-TRIB., Mar. 10, 2010.

<sup>320</sup> THE NRC STUDY ON URANIUM MINING IN VIRGINIA 3-4 (2010) (attachment to Funding and Security Agreement between VIRGINIA POLYTECHNIC INSTITUTE and State University and Virginia Uranium, Inc.) (on file with author).

<sup>321</sup> *Id.*

<sup>322</sup> See, e.g., John Crane, *Group Seeks Tobacco Money to Fund Second Part of Uranium Mining Study*, DANVILLE NEWS, Mar. 19, 2010, available at [http://www2.godanriver.com/gdr/news/local/danville\\_news/article/group\\_seeks\\_tobacco\\_money\\_to\\_fund\\_second\\_part\\_of\\_uranium\\_mining\\_study/19150/](http://www2.godanriver.com/gdr/news/local/danville_news/article/group_seeks_tobacco_money_to_fund_second_part_of_uranium_mining_study/19150/).

tion, disharmony, and imbalance of indigenous life in the process.<sup>323</sup>

Ultimately, while the decision whether to lift the moratorium will be made by politicians, not scientists, the policy goal should be to have science in the public interest determine the outcome.

If Virginia were to lift its moratorium on uranium mining and milling and grant a permit to VUI, the Commonwealth would be become the first state east of the Mississippi River to have uranium mining within its borders. With higher population densities and higher precipitation rates and lower evaporation rates than those found in the West, Virginia would provide an experiment in whether or not uranium mining and milling can be done safely in a wet environment in a rural community of nearby small farms and residences.

In its 1985 report, the Virginia Coal and Energy Commission recommended that Virginia seek to become an Agreement State for uranium production. Because Virginia is an Agreement State for other radioactive byproducts, it likely would seek this status again. Virginia would also have to originate a state program to regulate uranium mining. It would need geological and operational expertise in uranium mining and milling (including worker safety, monitoring, compliance, and enforcement) and be able to control tailings at least as stringently as the NRC. It would need the resources to conduct environmental reviews equivalent to those under NEPA, and the technical expertise in CWA, CAA, and CERCLA, as applied to uranium facilities – a new enterprise for Virginia state government. Virginia would need to establish fees and/or taxes to fund costs of a highly technical regulatory program, as well as ensure the imposition of financial assurances to ameliorate any unforeseen adverse impacts in a situation where actual costs are speculative at best.

Estimates are that the mining of the ore at Coles Hill would take perhaps thirty years.<sup>324</sup> After the ore is mined and milled, a long term plan would be implemented for the site, and either the Commonwealth or the Department of Energy would take title to the property and monitor and care for it in perpetuity. The costs of adequately caring for such a site forever are daunting to calculate.

Much is at stake: Uranium-238 lasts for thousands of years; chemicals used in the processing of uranium ore can wreak havoc on quality of streams, rivers, and groundwater; and airborne chemicals such as radon can pollute the air. Given the history of pollution of waterways by such persistent chemicals as polychlorinated biphenyls (PCBs), which remain in the sediments decades after they were released, will radioactive pollution become the next problem to plague our rivers and streams? Over the half-century since Rachel Carson's *Silent Spring*, new research has revealed that PCBs act as endocrine disrupters in human fetuses and can have devastating impacts on human growth and development.<sup>325</sup> And, as studies show, endocrine disruption is a culprit in radioactivity as well.<sup>326</sup>

In addition, exposure to uranium almost always involves exposure to other toxic materials, for example, nonradioactive heavy metals, solvents, and acids.<sup>327</sup> Scientists have pointed out the lack of studies examining the synergistic effects of these interactions.<sup>328</sup> Moreover, as risks from uranium exposure are still being discovered, it is impossible to know all of the potential hazards of uranium at this point.<sup>329</sup>

Lifting the moratorium on mining and milling uranium may open Pandora's Box not only in Pittsylvania County but also throughout the Northern Piedmont. As Virginia Tech Professor Robert Bodnar stated: "there's a high probability that there are other deposits of the same size, [and] same grade as Coles Hill located in the Eastern United States."<sup>330</sup> Mining and milling at Coles Hill alone could have devastating impacts on downstream water users, but many see it as a local problem, not recognizing that uranium resources exist along the entire Piedmont Region of Virginia. While no other reserves as large as Coles Hill have yet been verified, renewed interest in nuclear energy might spur the development of technology to extract and utilize lesser amounts and lower grades in other parts of the Commonwealth, thus bringing the same environmental concerns to other parts of the state. Thus, legislative decisions about lifting the moratorium in Virginia could have

<sup>325</sup> See THEO COLBORN ET AL., *OUR STOLEN FUTURE* (Dutton ed. 1996).

<sup>326</sup> See, e.g., Winde, *supra* note 107.

<sup>327</sup> Doug Brugge et. al., *Exposure Pathways*, *supra* note 109.

<sup>328</sup> *Id.*

<sup>329</sup> *Id.*

<sup>330</sup> Rice, *supra* note 19; Whitehead, *supra* note 319.

<sup>323</sup> Panikkar & Brugge, *supra* note 129, at 145.

<sup>324</sup> HEARSAY WITH CATHY LEWIS (WHRV-FM 89.5, Feb. 26, 2010) (interviewing Patrick Wales of VUI).

consequences beyond the Dan River and Roanoke River Watersheds.

Moreover, the bifurcated and complex federal-state regulatory regime for mining and milling does not assure protection of public health and safety. Instead, it raises many questions: Since the Commonwealth would regulate mining, how much additional expertise and staff would it need to design and enforce rules ensuring that mining this radioactive material is done in a manner that protects human health and the environment? How much will that cost? If, as expected, the Commonwealth were to seek Agreement State status to regulate mills under UMTRCA, would it have the expertise to handle NEPA-type environmental reviews at the beginning of the permit process as well as the expertise to design and enforce rules for mill operations to ensure safe disposal of tailings and waste rock? What would the cost be?

What about the potential impacts of unregulated TENORM – contaminated rock and soil removed during surface mining? Finally, is the Commonwealth prepared to take title or to have the federal government take title to any permitted uranium mill and tailings at the end of its operative life? What amount of bonding would be necessary to cover all possible harms of a mill facility from the commencement of its operations through perpetual care of the decommissioned site? What financial assurances are needed for the mining operations? How does this affect the cost-benefit ratio for state government?

Ultimately, the decision whether to lift the moratorium will be a political one for the General Assembly and the Governor. Will they be lured by the promise of economic prosperity from uranium mining and milling, despite the potential problems and costs to existing communities and to the Commonwealth? They and the citizens must seek to understand the full environmental and socio-economic costs (including the costs of regulation and perpetual care) versus the economic benefits of mining and uranium production, not only for Southside, but also for the Virginia Piedmont and its watersheds that serve millions of people in North Carolina and Virginia.