University of Richmond Law Review

Volume 18 | Issue 3 Article 5

1984

Unfinished Business: The Regulation of Uranium Mining and Milling

Elizabeth V. Scott
University of Richmond

NOTES

UNFINISHED BUSINESS: THE REGULATION OF URANIUM MINING AND MILLING

I. INTRODUCTION

In July of 1982, the Marline Uranium Corporation announced the discovery of a major deposit of commercially minable uranium in southside Virginia, the first major find east of the Mississippi River.[1] Marline and the Union Carbide Corporation are planning a $200 million mining and milling complex to develop the deposit. The operation is projected to create 900 new jobs and bring $4.3 million in yearly tax revenues to Virginia and to Pittsylvania County.[2]

Marline's discovery has sparked a growing controversy over uranium and its safety.[3] Uranium mining and milling release radioactivity, which could result in increased cancer rates for surrounding communities.[4] Employment in uranium mining jobs is exceptionally hazardous.[5] In addition, the mining and milling of uranium create environmental problems of water contamination,[6] air pollution,[7] and hazardous waste management.[8]

---

1. Hoke, *Major Uranium Deposit Found*, Richmond Times-Dispatch, July 22, 1982, at A1, col. 2. The Marline Corporation's geologic surveys indicate that approximately 30 million pounds of uranium oxide are located beneath a 100-acre tract in Pittsylvania County, Virginia. The total U.S. production of uranium oxide from western uranium mines totaled 38.5 million pounds in 1981.

2. *Id.*

3. A Virginia citizens' organization called "Stop Uranium Mining" reported in December, 1982, that five local governing boards and 21 organizations had called on the Virginia General Assembly to extend the current moratorium on uranium mining until it can be established that uranium can be mined safely. Stop Uranium Mining in Virginia Newsletter #5 (Dec. 1982). *See also* Eisman, *No Action Is Taken at Mining Hearing*, Richmond Times-Dispatch, Feb. 1, 1983, at A5, col. 6; *Citizens Ask for Moratorium on Uranium Mining*, The Virginian-Pilot, Jan. 7, 1983; *Uranium Moratorium Supported: Farm Bureau Passes Resolution*, The Daily Progress (Charlottesville), Dec. 2, 1982, at B7.

4. *See Summary of Evidence That Radionuclides Are Carcinogenic and Mutagenic to Humans*, 44 Fed. Reg. 76738 (1979) (adding radionuclides to EPA's list of Hazardous Air Pollutants).

5. *See, e.g.*, Archer, *Health Concerns in Uranium Mining and Milling*, 23 J. OCCUPATIONAL MED. 502 (1981); Gottlieb & Husen, *Lung Cancer Among Navajo Miners*, 81 CHEST 449 (1982). These studies found a mortality rate from lung cancer of 50% among workers who mined uranium for defense purposes in the 1950's and 1960's. *See also infra* text accompanying note 52.

6. *See infra* notes 34-44 and accompanying text.

7. *See infra* notes 45-51 and accompanying text.

The Virginia General Assembly recognized the necessity to move cautiously into uranium development, and enacted legislation in 1982 which allowed uranium exploration but instituted a one-year moratorium on the mining itself.[9] A special subcommittee of the State Coal and Energy Commission was formed to determine *if* and *how* uranium mining should be allowed. That committee, acting on the recommendations of a 200-page consultants' report,[10] urged the 1983 General Assembly to extend the moratorium for another year while more site-specific information was gathered. The General Assembly responded with a statute extending the moratorium until "July 1, 1984, and until a program for permitting uranium mining is established by statute."[11] A Uranium Administrative Group was created to evaluate studies submitted by industry and independent consultants and to recommend a course of action for the 1984 Assembly Session.[12]

The Uranium Administrative Group [UAG] issued its recommendations and proposals in December of 1983. Because of insufficiencies in the studies received to date, the UAG felt it was not then feasible to design a state regulatory program, and recommended that the moratorium be continued.[13] The Virginia Coal and Energy Commission, during the 1984 General Assembly session, adopted these recommendations and voted to continue the UAG's work for another year. The UAG has been given the mandate to continue the on-going studies, to assess the level of risk from uranium development that will be acceptable to the state, and to develop performance standards for the industry to assure that these risks will be

---

8. *See infra* notes 53-55 and accompanying text.

9. 1982 Va. Acts 269 (codified as amended at VA. CODE ANN. §§ 45.1-272 to -285 (Cum. Supp. 1983)).

10. ROGERS, GOLDEN & HALPERN, A REPORT ON PROPOSED URANIUM MINING IN VIRGINIA (Dec. 1982) [hereinafter cited as CONSULTANTS' REPORT]. The report was prepared for the Uranium Subcommittee of the Virginia Coal and Energy Commission by the consulting firm of Rogers, Golden & Halpern, a Philadelphia and Reston based firm with experience in hazardous waste management and land use issues. They were assisted by Senes Consultants Limited, a Canadian mining-industry consulting group. Piedmont Environmental Council, Newsreporter (Dec. 1982).

11. 1983 Va. Acts ch. 3 (amending VA. CODE ANN. § 45.1-283 and adding §§ 45.1-285.1 to -285.10). Two other uranium related bills were introduced during the 1983 General Assembly session, but both were defeated in committee. House Bill 615 proposed a five-year moratorium on mining, and House Bill 3 proposed giving counties and cities the authority to prohibit or regulate mining of uranium within their own jurisdictions. 1983 HOUSE JOURNAL 1301.

12. 1983 Va. Acts ch. 3. The Uranium Administrative Group is composed of the chairman of the Coal and Energy Commission and chief officers of the Council on the Environment, the State Water Control Board, the State Air Pollution Control Board, the State Board of Health, the Department of Conservation and Economic Development, the Department of Agriculture and Consumer Services, the Division of Industrial Development, and representatives from Pittsylvania and Halifax counties and from the public at large. *Id.*

13. *See* VA. S. DOC. NO. 13, REPORT OF THE VIRGINIA COAL AND ENERGY COMMISSION 7-9 (1984) (report of the Uranium Subcommittee).

limited to that acceptable level.[14]

If the decision is ultimately made to allow mining to proceed, the state will need to develop a comprehensive regulatory apparatus to ensure that the health and safety of Virginians, and Virginia's natural environment, are not endangered. Radioactive emissions will need to be controlled at *all* stages of the operation: exploration,[15] mining and milling,[16] mine reclamation,[17] and mill tailings disposal.[18] This note is a preliminary inquiry into what forms this regulation could take.[19]

This note will first examine the environmental and public health concerns associated with the radioactive byproducts of uranium mining and milling. The regulatory framework developed by the federal government, which attempts to alleviate these problems, will then be discussed. The note next will examine state responses to uranium developments and will analyze Virginia's existing regulatory structure and possible alternatives. The final section will evaluate the deficiencies in current regulatory schemes and the implications for Virginia of these shortcomings.

II. Environmental and Public Health Concerns

The first environmental impacts of uranium development are seen during the exploration phase. The exploration for uranium involves the drilling of bore holes to collect ore samples. Its chief environmental impact stems from the solubility of uranium and its by-products. Bore holes penetrating seams of uranium ore and underground aquifers[20] create channels through which groundwater runs, increasing the risk of groundwater contamination by dissolved radioisotopes.[21] This type of contamination has been seen in British Columbia, New Mexico, Wyoming, and Minne-

14. *Id.* at app. I (Resolution of the Virginia Coal and Energy Commission).

15. *See infra* notes 202-20 and accompanying text.

16. *See infra* notes 56-197, 221-47 and accompanying text.

17. *See infra* notes 198-201, 248-64 and accompanying text.

18. *See infra* notes 78-137, 265-90 and accompanying text.

19. This note is not a complete survey of all regulations applicable to uranium mining and milling. The regulation of energy development projects is exceptionally complex: one study of oil shale field development (with impacts analogous to uranium development) discovered that over 400 permits would apply to the project. Johns, *Permits and Approvals Required to Develop an Energy Project in Utah*, 1979 Utah L. Rev. 747. Areas not covered by this note include historic preservation, endangered species protection, water supply, and non-environmental areas such as mineral leasing, rights of way, and zoning and building permits.

20. An aquifer is "an underground bed or layer of earth, gravel, or porous stone that contains water." M. Landy, Environmental Impact Statement Glossary 219 (1979).

21. Polsgrove, *In Hot Water: Uranium Mining and Water Pollution* (Piedmont Environmental Council reprint). Radioisotopes are the decay products of uranium which are created as Uranium-238, and emit radiation in the form of alpha or beta particles, or gamma rays. Piedmont Environmental Council, Uranium: A Virginia Concern 13-17 (1982) [hereinafter cited as PEC Report].

sota, where elevated levels of radioactivity in groundwater have been reported near exploratory drilling sites.[22]

As the mining operation progresses from exploration to development, and as heavy equipment and drilling rigs are moved onto the site, land disturbance problems arise. Erosion and consequent stream siltation result from the disruption of the soil surface. Grading and reseeding of the site are thus necessary to maintain topsoil, and to preserve both stream flow and water quality in waterways adjoining the site.[23]

The most critical environmental and public health impacts of uranium development occur during the final three phases of the process: mining, milling, and waste disposal. Uranium mining and milling are two separate operations, generally carried on in close proximity to each other. The uranium mining process is conducted in one of three ways depending on the depth and character of the uranium deposit and the surrounding geologic formations.[24] Underground mining extracts deep deposits, while surface, or open pit mining techniques are used to extract shallow deposits of the ore.[25] The third variety, in situ (solution) mining, is used only where the uranium deposit is located between two layers of impervious rock. A leaching solution is pumped into the deposit, oxidizing and dissolving the uranium underground.[26] In situ mining combines mining and milling in one operation. The dissolved uranium is pumped to the surface where it is precipitated from the leaching solution and processed for commercial use.[27]

Uranium extracted by underground or surface mining methods is sent

---

22. Piedmont Environmental Council, *Environmental and Public Health Hazards Relating to Uranium Mining* (1982) (fact sheet prepared by P.E.C. for the 1982 General Assembly session). *See* Eadie & Kauffman, *Radiological Evaluation of the Effects of Uranium Mining and Milling Operations on Selected Groundwater Supplies in the Grants Mineral Belt, New Mexico*, 32 HEALTH PHYSICS 231 (1977).

23. *See, e.g.*, REPORT OF VALC ON SURFACE MINING OTHER THAN COAL 11, HOUSE DOCUMENTS (1968 regular session) (discussing mine reclamation problems).

24. "Selection of the mining method is based primarily on the economics of the ore body, site specific limitations and regulatory requirements." PINCOCK, ALLEN & HOLT, DESCRIPTION OF THE SWANSON URANIUM PROJECT § 3.1 (Nov. 1982) [hereinafter cited as SWANSON PROJECT REPORT]. This report was prepared for the Marline Corporation by a mining consulting firm and describes the type of mining-milling complex appropriate for the Pittsylvania county site.

25. Riccitiello, *Uranium Mining and Milling, A Primer*, 4 THE WORKBOOK 222, 224-25 (1979). The Pittsylvania deposit would utilize an open-pit method to extract the first 500 feet of the deposit, and could eventually develop an underground mine to extract deeper deposits. Underground mining, however, involves "high preproduction, capital investment and operating costs," and would not be undertaken until the surface mining nears completion. SWANSON PROJECT REPORT, *supra* note 24, §§ 3.1, 3.4.

26. *See* Peshlakai v. Duncan, 476 F. Supp. 1247, 1251 (D.D.C. 1979) (discussing the in situ mining process).

27. Riccitiello, *supra* note 25, at 225. In situ mining is not likely to be used in Virginia. CONSULTANTS' REPORT, *supra* note 10, at 28.

through a milling process to convert the ore into commercially usable uranium oxide, or "yellowcake." The ore is crushed, ground, and processed through a series of chemical leaches which extract the yellowcake.[28] Only a small percentage of the ore contains the valuable uranium oxide; one to five pounds are extracted from each ton of ore.[29]

The waste ore, called tailings, poses the greatest threat to public health. The tailings still contain 85% of their original radioactivity after the extraction of the yellowcake. Uranium decay products, such as thorium-230 (with a half-life of 80,000 years) and radon (an air-borne gas) remain in the tailings.[30] These tailings are generally pumped from the mill in a semi-liquid slurry form which combines waste water from the milling process and the leaching solution with the radioactive mill tailings.[31] The slurry is deposited in a tailings pond, where the liquids evaporate or seep into the ground,[32] leaving the dry tailings for later disposal.[33]

The Marline Corporation, in a 1982 meeting with Halifax County supervisors, assured the officials that there is "zero" chance of a radioactive release from the proposed mining and milling complex contaminating water supplies in Virginia.[34] Their confidence, however, is not shared by regulatory authorities. The EPA, in proposing standards for disposal of tailings,[35] examined extensively the water-transmitted hazards of uranium mill tailings. Mill emissions contain suspended solids, organic compounds, arsenic, zinc, radium, ammonia, and altered pH levels.[36] The tail-

---

28. *See* Grammer, *The Uranium Mill Tailings Radiation Control Act of 1978 and NRC's Agreement State Program*, 13 NAT. RESOURCES LAW. 469, 470 (1981); Linker, Beers & Lash, *Radioactive Waste: Gaps in the Regulatory System*, 56 DEN. L.J. 1, 3 (1979). The leaching solution is either highly acidic or highly alkaline, depending on the chemical composition of the ore, and can result in a potentially hazardous pH level in the tailings. Grammer, *supra*, at 470-72. *See also* Riccitiello, *supra* note 25, at 224-26.

The proposed Pittsylvania mill will probably use an alkaline leach using sodium carbonate and sodium bicarbonate to dissolve the uranium oxide and separate it from the tailings. Excess sodium would be removed from the yellowcake with sulfuric acid. SWANSON PROJECT REPORT, *supra* note 24, § 4.12.

29. Grammer, *supra* note 28, at 471; Magee, *The Uranium Mill Tailings Radiation Control Act of 1978*, 8 ECOLOGY L.Q. 801 (1980). The Pittsylvania deposit is expected to yield four pounds of uranium oxide per ton of ore. SWANSON PROJECT REPORT, *supra* note 24, § 4.0.

30. Linker, *supra* note 28, at 4; Riccitiello, *supra* note 25, at 223.

31. *Id.* The proposed Pittsylvania mill would use between 1.2 and 1.8 million gallons of water daily, 60-80% of which would be recycled. The remaining water would be emitted as vapor or expelled with the tailings. SWANSON PROJECT REPORT, *supra* note 24, § 4.7-.8.

32. Grammer, *supra* note 28, at 471.

33. Linker, *supra* note 28, at 3.

34. *"Zero" Chance of Radioactivity, Marline Asserts*, Richmond Times-Dispatch, Oct. 2, 1982.

35. *See* 46 Fed. Reg. 2893 (1981); 47 Fed. Reg. 25682 (1982).

36. *See* EPA's Regulations on Effluents From Existing Uranium Mills, 47 Fed. Reg. 25682 (1982) (to be codified at 40 C.F.R. § 440.52(b)).

ings contain radioactive uranium, thorium, and radium, as well as the non-radioactive, but still hazardous, lead, arsenic, cadmium, chloride, fluoride, and various other heavy metals.[37] Both the radionuclides and the non-radioactive toxic substances could contaminate both ground and surface water if not properly controlled.[38]

These concerns are not mere speculation; several New Mexico towns have experienced problems with contamination of drinking water from milling operations. Radioactivity levels in river water were found in one area to exceed the federal standards, but more importantly, due to bioaccumulation of minerals in the food chain, radium concentrations found in plant and animal life were 100 to 10,000 times higher than the river water contaminant levels. Crops irrigated with the river water also concentrated the radium to levels 100 times greater than those in the water.[39] Mill tailings can also contaminate ground water with toxic chemicals and heavy metals. Sulfuric acid, iron, manganese, sulphate, selenium, radium, thorium, and lead (from both the tailings and the chemical leachate) have been found to seep into the ground below tailings ponds.[40]

The possibility of tailings pond spill-over or dam failure also threatens surface water. The potential for this type of contamination was brought home forcefully in 1979 when a two-year-old tailings dam broke in Church Rock, New Mexico. The accident, termed by one Nuclear Regulatory Commission (NRC) official as "the worst incident of radiation contamination in the United States,"[41] caused extensive ground and surface water contamination. Ninety-three million gallons of contaminated liquid and 1100 tons of radioactive tailings were deposited into the Rio Puerco River, contaminating the surface water, the banks, and the river bottom for sixty miles downstream. Groundwater deposits were contaminated by seepage to depths of thirty to forty feet. The water supplies for three towns and an Indian Reservation were rendered unsafe for drinking. The milling company has removed the toxic material from the river bed, but

37. Grammer, *supra* note 28, at 471-72. *See also* Proposed Disposal Standards for Inactive Uranium Processing Sites, 46 Fed. Reg. 2556, 2558 (1981).

38. *See* Kerr-McGee Nuclear Corp. v. NRC, 17 Env't Rep. Cas. (BNA) 1537, 1550, *withdrawn, reh'g granted*, 673 F.2d 1124 (10th Cir. 1982). While the opinion has no precedential value, it contains a lengthy discussion of Nuclear Regulatory Commission findings, contained in a Generic Environmental Impact Statement, about risks posed by uranium mill tailings.

39. Linker, *supra* note 28, at 7. *See also* Eadie & Kauffman, *supra* note 22; PEC REPORT, *supra* note 21, at 26-27 (summarizing water quality studies near uranium mills in Colorado, Wyoming, Texas, and New Mexico. These studies all found massive increases in uranium and radium-226 concentrations in surface water and sediments.).

40. *Kerr-McGee*, 17 Env't Rep. Cas. (BNA) 1537 (challenging the NRC's standards governing licensing of uranium mills and mill tailings).

41. Richards, *Modern Uranium Pond Dam Breaks in New Mexico*, SIERRA CLUB BULL., Nov.-Dec. 1980.

groundwater supplies may never be purified.[42]

Water pollution from mining operations occurs when groundwater (or rain water) accumulates in an underground or surface mine. Water passing through the loose rock can pick up both radioactive and toxic contaminants, and must be treated before being released into neighboring surface waters.[43] When this water is pumped from the mine, it has the ancillary effect of lowering the local water table, leading to a decrease in well water availability in the surrounding community. Lowered water levels and dry wells have been reported near western uranium mines, which pump from 200 to 6,000 gallons of water per minute from each mining operation.[44]

Air pollution from uranium mining is created as soon as soil and rock are removed from the uranium ore deposit. The ore, when exposed to air, gives off radon, a radioactive gas. Radon attaches to respirable dust particles which, when breathed into the lungs, emit radiation in the form of alpha particles.[45] An additional hazard arises when radon enters buildings, where the concentration of its decay products builds up in the air within the structure.[46]

The uranium milling operation also emits several radioactive pollutants, including radon.[47] These radioactive emissions, whether from mines or mills, can lead to an increased cancer risk to the surrounding community[48]—a risk which the EPA has found to exceed by far the risk from nuclear power plants.[49] The extent of the actual health risk from these airborne radionuclides is unknown, but the National Academy of Science has cautioned that there is "no low-dose threshold below which radiation exposure is harmless."[50] Radiation is not the sole pollutant emitted dur-

---

42. *See* UNC Resources, Inc. v. Benally, 518 F. Supp. 1046 (D. Ariz. 1981); UNC Resources, Inc. v. Benally, 514 F. Supp. 358 (D.N.M. 1981); Grammer, *supra* note 28, at 512-13; Richards, *Modern Uranium Pond Dam Breaks in New Mexico*, SIERRA CLUB BULL., *supra* note 41; Pinsky, *New Mexico Spill Ruins a River*, CRITICAL MASS J., Dec. 1979; 10 ENV'T REP. (BNA) 1465 (Oct. 26, 1979).

43. Riccitiello, *supra* note 25, at 224, 227. *See also* SWANSON PROJECT REPORT, *supra* note 24, §§ 3.14-.15.

44. Riccitiello, *supra* note 25, at 224-27.

45. Gottlieb & Husen, *supra* note 5, at 450.

46. 48 Fed. Reg. 15083 (1983).

47. *See infra* notes 149-54 and accompanying text.

48. *See* EPA's Summary of Evidence that Radionuclides Are Carcinogenic and Mutagenic to Humans, 44 Fed. Reg. 76738 (1979) (adding radionuclides to the list of hazardous air pollutants regulated under the Clean Air Act). *But cf.* SWANSON PROJECT REPORT, *supra* note 24, § 3.15, suggesting that radon levels will not be a problem because of "excellent ventilation" and the absence of "extremely high grade" uranium in the deposit.

49. 44 Fed. Reg. 76738, 76741-46 (1979). Nuclear reactors pose an expected risk of 0.001 fatal cancers per year of operation. Underground uranium mines and mills pose a risk, respectively, of 0.03 and 0.01 fatal cancers per year of operation.

50. *Kerr-McGee*, 17 Env't Rep. Cas. (BNA) at 1540 (quoting the National Academy of

ing the uranium development process; other air pollutants generated include particulates, sulfur oxides, carbon monoxide, organics, and nitrogen oxides.[51]

The most severe public health effects from uranium mining and milling have resulted from occupational exposure. When uranium was mined for defense purposes in the 1950's and 1960's no regulatory control existed over radiation levels in the mines. A 1981 epidemiology study reported a mortality rate from lung cancer of 50% among these miners. The study noted increased lymphatic cancers among uranium mill workers and a prevalence of chronic respiratory diseases—emphysema, chronic bronchitis, silicosis, and pulmonary fibrosis—among the miners.[52]

The health hazard to the general public is lower than the occupational risk, but still presents enough of a problem to warrant concern. Public exposure to radiological hazards is increased when mill tailings are exposed to the elements. This was standard practice for years at western uranium mills where tailings were left in piles around mill sites and exposure to wind and precipitation resulted in tailings material entering air, surface water, and groundwater. One city, Grand Junction, Colorado, used the radioactive tailings as construction material for roads, sewers, and building foundations.[53]

These tailings piles created a public health risk through the spread of windblown particles and gas, and through direct gamma radiation from the tailings.[54] A House of Representatives report in 1978 commented that "[t]he dangers which accompany [the mill tailings radioactive decay process] . . . will continue for a billion years. As a result of being for all practical purposes, a perpetual hazard, uranium mill tailings present the major threat of the nuclear fuel cycle."[55]

III. Federal Regulation of Uranium Mining and Milling

A. *The Atomic Energy Act of 1954*

In 1954, Congress passed the Atomic Energy Act[56] to regulate the civilian development, use, and control of nuclear energy. The Act established

---

Science Comm. on the Biological Effects of Ionizing Radiation).

51. Riccitiello, *supra* note 25, at 227.

52. Archer, *supra* note 5, at 502-03.

53. Grammer, *supra* note 28, at 478. *See* Grand Junction Remedial Action Criteria, 10 C.F.R. pt. 1020 (1983).

54. EPA Proposed Disposal Standards for Inactive Uranium Processing Sites, 46 Fed. Reg. 2556 (1981); Linker, *supra* note 28, at 4.

55. H.R. Rep. No. 1480, pt. 1, 95th Cong., 2d Sess. 11, *reprinted in* 1978 U.S. Code Cong. & Ad. News 7433.

56. Pub. L. No. 83-703, 68 Stat. 919 (codified as amended at 42 U.S.C. § 2011 (1976 & Supp. V 1981)).

a regulatory agency, the Atomic Energy Commission (AEC), which was given regulatory authority over all users of source, byproduct, and special nuclear material.[57] Under the terms of the Act, however, AEC jurisdiction extended only to uranium milling operations. The AEC license, required of all handlers of radicactive materials, is only necessary "after removal [of the material] from its place of deposit in nature;"[58] mining operations are thus excluded from AEC licensing authority. In addition, the Act's definition of byproduct material did not include the tailings produced by the uranium milling operation,[59] so that the radioactive tailings materials were left unregulated.

For sixteen years, the AEC was the sole United States regulatory body with authority over uranium milling. During that time, the AEC set its Standards for Protection Against Radiation,[60] and enforced these standards through its licensing procedures.[61] In 1970, some of the AEC's authority was transferred to the newly-organized Environmental Protection Agency.[62] The EPA was given responsibility for developing standards to protect against radioactive pollution of the environment, and for providing guidance to all federal agencies on radiation protection.[63] Several years later, in 1974, the AEC was dissolved and its responsibilities were divided between two new agencies, the Energy Research and Development Administration (ERDA) (now part of the Department of Energy) and the Nuclear Regulatory Commission (NRC).[64] AEC control over uranium milling is now vested in the NRC.

The NRC regulates uranium milling through its licensing program.[65]

---

57. *See* 42 U.S.C. § 2014(e), (z), (aa) (1976). Pursuant to this section, the Nuclear Regulatory Commission defines "Source" and "Special Nuclear Material":

> (z) "Source material" means (1) uranium or thorium or any combination thereof, in any physical or chemical form or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of (i) uranium, (ii) thorium, or (iii) any combination thereof. Source material does not include special nuclear material. (aa) "Special nuclear material" means (1) Plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Commission, pursuant to the provisions of § 51 of the Act, determines to be special nuclear material; or (2) any material artificially enriched by any of the foregoing.

10 C.F.R. § 40.4 (1983). "Byproduct Material" was originally defined by the Act as "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." 42 U.S.C. § 2014(e) (1976).

58. 42 U.S.C. § 2092 (1976); 10 C.F.R. § 40.3 (1983). *See* Grammer, *supra* note 28, at 474.

59. See definition of byproduct material, *supra* note 57.

60. 10 C.F.R. pt. 20 (1983).

61. *Id.* pt. 40.

62. Reorganization Plan No. 3 of 1970, 3 C.F.R. 1072 (1966-70 compilation).

63. *Id.* § 2(6), (7); Hallmark, *Radiation Protection Standards and the Administrative Decision Process*, 8 ENVTL. L. 785, 789 (1978); Linker, *supra* note 28, at 2 n.1.

64. Energy Reorganization Act of 1974, Pub. L. No. 93-438, 88 Stat. 1233.

65. 42 U.S.C. § 2133 (1976 & Supp. V 1981); 10 C.F.R. pt. 40 (1983).

The NRC regulations, the Standards for Protection Against Radiation, set limits on radiation levels both inside and outside of the licensed mill facilities.[66] The milling operations must monitor exposure to employees as well as effluents to the external environment to assure that allowable radiation levels are not exceeded.[67]

The licensing requirements of the Act provide for enforcement of these standards. The licenses are renewable every five years,[68] and do not terminate until the mill facilities are decontaminated and the mills are decommissioned.[69] In order to receive an initial operating license, the milling company must demonstrate that it has the training, experience, and proper materials to safely handle uranium, that its facilities are adequate to protect health and minimize dangers to life or property, and that the issuance of a license would "not be inimical to the common defense and security or to the health and safety of the public."[70]

Before a mill license can be approved, the NRC must prepare an environmental impact statement (EIS) pursuant to the National Environmental Policy Act. NEPA requires that such a statement be developed on every "major federal action significantly affect[ing] the human environment."[71] The federal NEPA guidelines require an independent governmental assessment of the proposed mill, "including an analysis of the baseline environment, . . . consideration of alternatives for siting and tailings disposal, an examination of the environmental and socioeconomic costs and benefits . . . and other information necessary for a licensing decision."[72]

The NRC will allow states to take over the regulation of uranium milling through its "Agreement State Program."[73] The original NRC guide-

---

66. 10 C.F.R. pt. 20 (1983).

67. *Id.*

68. SHAW, PITTMAN, POTTS, & TROWBRIDGE, REPORT ON THE APPLICATION OF ENVIRONMENTAL LAWS TO URANIUM MINING AND MILLING IN THE COMMONWEALTH OF VIRGINIA 32 (1981) (private report prepared for the Marline Uranium Corporation discussing permit requirements under state and federal law) [hereinafter cited as SHAW REPORT].

69. 10 C.F.R. pt. 40, app. A (1983); SHAW REPORT, *supra* note 68, at 9.

70. 10 C.F.R. §§ 40.32(b)-.32(d) (1983).

71. 42 U.S.C. §§ 4321-4335 (1976 & Supp. V 1981); 10 C.F.R. pt. 51 (1983). *See, e.g.*, 7 ENV'T REP. (BNA) 395 (July 2, 1976) (discussing suspension of several uranium mining leases pending compliance with NEPA's EIS requirement).

72. Grammer, *supra* note 28, at 474 (citing 10 C.F.R. § 51.5 (b) (1983)). *See* Manygoats v. Kleppe, 558 F.2d 556 (10th Cir. 1977) (where a challenged EIS filed by the NRC on a uranium mining-milling operation was held to be a "comprehensive, good faith, objective, and reasonable presentation." *Id.* at 561). *Cf.* Peshlakai v. Duncan, 476 F. Supp. 1247 (D.D.C. 1979) (where an EIS on a pilot in situ uranium mining project was held to be unnecessary. Possible impacts of the project were said to be minor and speculative, and a regional EIS was underway to review overall uranium development in the area.).

73. 42 U.S.C. § 2021 (1976 & Supp. V 1981). Uranium mining states with their own licensing programs include New Mexico, Colorado, Texas, Oregon, and Washington. Grammer,

lines for state programs required merely that the state plans be "compatible" with the federal NRC program and did not require preparation of an EIS before state licensing.[74] This practice was challenged in 1977, however, when the Natural Resources Defense Council (NRDC) charged that the NRC and the "agreement state plan" of New Mexico violated NEPA by failing to require an EIS on proposed mills. The NRDC specifically challenged New Mexico's granting of a license to United Nuclear's Church Rock mill.[75] The case was settled out of court three days after the Church Rock mill tailings dam collapsed in July of 1979.[76] As a result of that case and subsequent regulatory and legislative changes, state regulation must now be equivalent to or more stringent than the NRC licensing practices, and must include provisions for public participation and environmental impact assessment.[77]

B. *The Uranium Mill Tailings Radiation Control Act of 1978*

The restriction of Atomic Energy Act (AEA) coverage to uranium milling operations left several serious regulatory gaps.[78] The first gap, uranium mining operations, has been partially filled, in a piecemeal fashion, by federal laws covering water pollution,[79] air pollution,[80] employee protection,[81] and hazardous waste management.[82] The second serious gap was regulation of uranium mill tailings. These tailings, excluded from the AEA categories of source and byproduct material,[83] were left for years in piles around uranium mill sites.[84] Many of the mills have since closed down, leaving behind over twenty-six million tons of radioactive material.[85] This material contains an estimated 15,000 curies[86] of radium

---

supra note 28, at 475 n.33. Virginia is not an agreement state, but the Uranium Administrative Group and the Coal and Energy Commission have both advocated that Virginia should obtain such status from the NRC before uranium development is licensed in the state. VA. S. DOC. NO. 13, REPORT OF THE VIRGINIA COAL AND ENERGY COMMISSION 7-9 & app. I (1984).

74. Grammer, *supra* note 28, at 475.

75. National Resources Defense Council v. NRC, No. 77-240-B (D.N.M. filed May 3, 1977), *in* [Pending Litigation] ENVTL. L. REP. (ENVTL. L. INST.) 65462 (July 1977).

76. 10 ENV'T REP. (BNA) 906 (Aug. 3, 1979).

77. *See* Uranium Mill Tailings Radiation Control Act of 1978, Pub. L. No. 95-604, § 204(e), 92 Stat. 3031 (amending the Atomic Energy Act of 1954, 42 U.S.C. §§ 2011-2296. (1976 & Supp. V 1982)); 10 C.F.R. § 150.31 (1983) (requiring state compliance with any standards promulgated by NRC or EPA under the Uranium Mill Tailings Radiation Control Act). *See also* Linker, *supra* note 28, at 14.

78. Linker, *supra* note 28, at 3.

79. *See infra* notes 165-87 and accompanying text.

80. *See infra* notes 138-64 and accompanying text.

81. *See infra* notes 188-97 and accompanying text.

82. *See infra* notes 198-201 and accompanying text.

83. *See supra* notes 57-59 and accompanying text.

84. 48 Fed. Reg. 592 (1983). *See* Note, *The Uranium Mill Tailings Radiation Control Act of 1978*, 8 ECOLOGY L.Q. 801 (1980).

85. Gilinsky, *NRC Regulation of the Uranium Milling Industry: Problems and Pros-*

which will not decay to safe levels for several hundred thousand years.[87] An additional public health hazard developed in those areas where tailings were used for building materials.[88]

Congress first moved towards regulation of uranium mill tailings in 1972, with the passage of an act to provide cleanup of tailings in Grand Junction, Colorado.[89] Grand Junction is perhaps the worst case of tailings mismanagement. Between 1950 and 1966 the Climax Uranium Company donated 300,000 tons of the radioactive mill tailings for use in constructing roads, sewers, and foundations for offices and homes.[90] The tailings were eventually used in over 700 locations.[91] As of 1980, the Department of Energy had cleaned up approximately half of the sites.[92] In February of 1984, 6,900 more locations in Grand Junction were designated as sites suspected of containing mill tailings. These properties will be surveyed, and those emitting hazardous levels of radioactivity will be slated for remedial cleanup.[93]

In 1974, Congress began looking at problems at other mill tailings disposal sites and requested that ERDA study problem areas.[94] The NRC followed up the next year, on the urgent request of the Natural Resources Defense Council, and began preparation of a Generic EIS to evaluate regulatory programs on uranium milling.[95] On the basis of the findings of the ERDA and NRC studies, Congress finally acted to control the environmental and public health problems caused by uranium mill tailings.

The Uranium Mill Tailings Radiation Control Act (UMTRCA),[96] passed in 1978, is "intended to protect the public health and safety and

---

pects, reprinted in Uranium Mill Tailings Radiation Control Act of 1978: Hearings on H.R. 11698, H.R. 12229, H.R. 12938, H.R. 12535, H.R. 13049, and H.R. 13650 Before the Subcomm. on Interstate and Foreign Commerce, 95th Cong., 2d Sess. 230 (1978) [hereinafter cited as *UMTRCA Hearings*].

86. A "curie" is a measurement of radioactivity, defined as "that amount of any radioactive material which decays at the rate of 3.70 x 10^{10} disintegrations per second." G. DAVIS, RADIATION AND LIFE 277 (1970).

87. 48 Fed. Reg. 592 (1983). These tailings also contain the toxins arsenic, molybdenum, selenium, and uranium. The non-radioactive toxic chemicals persist in the environment indefinitely. *Id.*

88. *See supra* note 53 and accompanying text.

89. Pub. L. No. 92-314, 86 Stat. 222 (1972); *see also* Grand Junction Remedial Action Criteria, 10 C.F.R. pt. 1020 (1983).

90. Grammer, *supra* note 28, at 478.

91. Linker, *supra* note 28, at 7.

92. U.S. DEPT. OF ENERGY, ANNUAL STATUS REPORT ON THE URANIUM MILL TAILINGS REMEDIAL ACTION PROGRAM 2 (1980) [hereinafter cited as 1980 STATUS REPORT].

93. 49 Fed. Reg. 4127 (1984).

94. 1978 U.S. CODE CONG. & AD. NEWS 7433, 7434.

95. Kerr-McGee Nuclear Corp. v. N.R.C., 17 Env't Rep. Cas. (BNA) 1537, 1550 *withdrawn, reh'g granted*, 673 F.2d 1124 (10th Cir. 1982).

96. Pub. L. No. 95-604, 92 Stat. 3033 (1978).

the environment from hazards associated with wastes from the uranium ore milling process."[97] UMTRCA amended the Atomic Energy Act of 1954, changing the definition of byproduct material under NRC's jurisdiction to include uranium mill tailings.[98] UMTRCA is divided into two titles, the first mandating cleanup of abandoned tailings sites, and the second establishing a regulatory framework for existing mills. Under Title I, twenty-five abandoned sites have been designated for remedial action.[99] The EPA has the authority to draw up regulations on cleanup and disposal of the tailings, while the Department of Energy, with state assistance, will conduct the cleanup operations.[100]

Under Title II's regulatory framework, the EPA is charged with setting general standards for mill tailings disposal at existing mills and the NRC will insure compliance through its licensing procedures.[101] UMTRCA mandates safe disposal of tailings, and requires each licensee to provide "an adequate bond, surety, or other financial arrangement . . . for the decontamination, decommissioning, and reclamation"[102] of the mill after permanent closure of the facility. To insure the long-term stabilization and maintenance of the mill sites, ownership of the tailings passes to the federal government or the state after the mill's decommission.[103]

In 1980, the EPA issued the first of the regulations mandated by UMTRCA—environmental standards for cleanup of lands and buildings

---

97. 1978 U.S. CODE CONG. & AD. NEWS 7433, 7435.

98. Pub. L. No. 95-604, § 201, 92 Stat. 3033 (1978) (amending 42 U.S.C. § 2014 (1975)). The NRC acted the next year to change its regulatory definition of byproduct material. 44 Fed. Reg. 50012 (1979); 49 Fed. Reg. 55327 (1979). That new definition now provides:

> "Byproduct material" means the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by such solution extraction do not constitute "byproduct material" within this definition.

10 C.F.R. § 40.4(a) (1983). *Cf. supra* note 57.

99. Twenty-two sites were named in the UMTRCA, 42 U.S.C. § 7912 (a)(1) (Supp. V 1981). Two additional uranium processing sites were later designated for remedial action by the Dept. of Energy (DOE). The twenty-five sites now identified are in Arizona, Colorado, Idaho, New Mexico, North Dakota, Oregon, Pennsylvania, Texas, Utah, and Wyoming. 1980 STATUS REPORT, *supra* note 92, at 11-12. Under Title I of UMTRCA, the DOE was also charged with identifying, within one year, any properties in the vicinity of the twenty-five sites which have been contaminated by tailings material. 42 U.S.C. § 7912(e)(1) (Supp. V. 1981). By 1983, the DOE had not yet released this list. The Sierra Club and the Natural Resources Defense Council sought a court order to compel the DOE to comply with UMTRCA. *See* Sierra Club v. Edwards, 19 Env't Rep. Cas. (BNA) 1357 (D.D.C. 1983). Pursuant to a consent order issued in this case, in 1984 the DOE released a list of 8156 properties thought to be contaminated with tailings materials. These sites will be studied further to determine the need for any future remedial action. 49 Fed. Reg. 4127 (1984).

100. 42 U.S.C. §§ 7912-7913 (Supp. V 1981).

101. Pub. L. No. 95-604, §§ 202-209, 92 Stat. 3021, 3033-41 (1978).

102. Pub. L. No. 95-604, §§ 202-203, 92 Stat. 3021, 3033-36 (1978).

103. Pub. L. No. 95-604, § 202(a)(2), 92 Stat. 3021, 3034 (1978).

contaminated with mill tailings from inactive sites.[104] Standards for disposal for the tailings themselves at these abandoned sites were proposed in early 1981,[105] but two years passed before the EPA issued final regulations.[106] These final cleanup regulations differ in several significant ways from the original EPA proposal. The proposed regulations required disposal of the tailings in such a way as to assure stabilization and control for 1000 years, with radon emissions limited to two picocuries per square meter per second. The new regulations relax these requirements. Stabilization should be sought for up to 1000 years or to the extent reasonably achievable, but at least for 200 years, while radon emissions must be cut to twenty picocuries per square meter per second.[107]

The EPA regulations were immediately challenged by both environmental and mining groups. The Sierra Club and three other organizations filed suit charging that the final rules were significantly weaker and fail to provide for protection of groundwater.[108] The American Mining Congress[109] and United Nuclear Corporation[110] also filed suit, challenging the EPA rules as too stringent.

The standards for mill tailings disposal at active mill sites have had a complicated and much litigated history. The EPA, charged with promulgating these regulations, did not do so until October, 1983,[111] five years after passage of the UMTRCA. The excessive delay in EPA's promulgation of Title II regulations prompted the NRC, the agency charged with enforcing the UMTRCA, to issue its own guidelines in 1981 applicable to all uranium mill licenses.[112] These NRC guidelines made licensing contingent on meeting UMTRCA specifications, and included criteria for disposal site selection, stabilization, and erosion prevention. The guidelines also mandated daily inspection of facilities, reduction of airborne effluent

104. 45 Fed. Reg. 27367 (1980) (codified at 40 C.F.R. §§ 192.11-.22 (1980)).

105. 46 Fed. Reg. 2556 (1981).

106. 48 Fed. Reg. 590 (1983) (codified at 40 C.F.R. pt. 192 (1983)). At the same time the EPA issued an advance notice for proposed rulemaking to develop standards for controlling mill tailings at lower priority disposal sites. 48 Fed. Reg. 605 (1983).

107. *See* 48 Fed. Reg. 592 (1983) (summarizing the differences between the proposed and final regulations). The proposed rules set out specific standards for surface and groundwater protection for ten named toxins. 46 Fed. Reg. 2560-61, 2563-64 (1981). The new rules abandon these special standards, and require compliance with existing state and federal regulations for water protection. 48 Fed. Reg. 592 (1983).

108. Sierra Club v. Gorsuch, No. 83-1206 (10th Cir. 1983), *cited in* 13 ENV'T REP. (BNA) 2045 (Mar. 11, 1983). Other plaintiffs in the suit include the Environmental Defense Fund, the Natural Resources Defense Council, and the Southwest Research and Information Center. *Id.*

109. American Mining Congress v. Gorsuch, No. 83-1014 (5th Cir. 1983), *cited in* 13 ENV'T REP. (BNA) 2045 (Mar. 11, 1983).

110. United Nuclear Corp. v. EPA, No. 83-1041 (5th Cir. 1983), *cited in* 13 ENV'T REP. (BNA) 2045 (Mar. 11, 1983).

111. 48 Fed. Reg. 45926 (1983).

112. 10 C.F.R. pt. 40, app. A (1983).

from milling, elimination of seepage of toxic substances into groundwater sources, and financial surety arrangements to cover the cost of decontamination, decommission, and reclamation of the tailings disposal areas.[113]

The 1980 NRC criteria were promptly challenged in court by the uranium industry.[114] Kerr-McGee and several other uranium companies claimed that the NRC had usurped the EPA's authority, and that the regulations issued were arbitrary and capricious, and imposed "an economic burden that would close uranium mills."[115] They also challenged the technical and financial criteria set out in the guidelines. The Court of Appeals for the Tenth Circuit, in March, 1982, ruled against the industry, saying that the legislative intent of the statute clearly allowed the NRC to act before the EPA,[116] and that the standards imposed were reasonable.[117]

Congress, however, put an effective halt to the NRC's implementation of its regulations. In December, 1981, Congressman Stratton attached an amendment to the Energy and Water Development Appropriation Act of 1982[118] prohibiting the NRC from spending any of its 1982 appropriations to implement the mill tailings regulations.[119] Congressman Stratton criticized the NRC's move, and convinced Congress to withold funds until the EPA regulations were promulgated.[120]

The 1983 Nuclear Regulatory Commission Authorization Act[121] restored the NRC's authority to regulate uranium mills on a case-by-case basis after January 1, 1983.[122] This authority, however, was strictly curbed. The NRC was ordered to suspend any regulations that conflicted with those proposed[123] (but not yet finalized) by the EPA, and to conform its rules to the EPA's final regulations by April 1, 1984.[124]

The Conference Report on the 1983 Act was critical of the EPA's failure to act promptly to meet its UMTRCA responsibilities.[125] A new dead-

---

113. *Id.*

114. *Kerr-McGee*, 17 Env't Rep. Cas. (BNA) 1537.

115. *Id.* at 1541.

116. *Id.* at 1548.

117. *Id.* at 1553.

118. Pub. L. No. 97-88, tit. IV, 95 Stat. 1135, 1147-48 (1981).

119. See *Kerr-McGee*, 17 Env't Rep. Cas. (BNA) at 1547-48; 47 Fed. Reg. 7205 (1982).

120. S. REP. No. 256, 97th Cong., 1st Sess. 154 (1981) (cited in *Kerr-McGee*, 17 Env't Rep. Cas. (BNA) at 1547-48).

121. Pub. L. No. 97-415, 96 Stat. 2067 (1983).

122. 1982 U.S. CODE CONG. & AD. NEWS 3616-17.

123. *See* 48 Fed. Reg. 19584 (1983).

124. 1982 U.S. CODE CONG. & AD. NEWS 3616. The NRC met the first of these requirements in August, 1983, suspending those regulations that would have required licensees to make major commitments that could later be rendered unnecessary under the forthcoming EPA rules. 48 Fed. Reg. 35350 (1983).

125. *See* 1982 U.S. CODE CONG. & AD. NEWS 3614 ("The conferees wish to emphasize their

line, October 1, 1983, was set for the EPA to issue its final tailings regulations for active mills, and the bill specifically provided that the EPA's authority to promulgate these rules would terminate if the deadline was not met.[126] The EPA barely met this deadline; the new mill tailings rules were announced on September 30, 1983.[127]

The new mill tailings regulations have drawn fire from all sides. Environmental organizations have charged that the standards, which apply restrictions similar to those for inactive site tailings disposal,[128] are inadequate to protect the public and fail to consider future population statistics or possible geological phenomena. The Environmental Defense Fund filed suit on October 7, 1983, to challenge the regulations.[129]

The EPA has also faced a barrage of criticism on the other side. The American Mining Congress filed suit in October, 1983, challenging the rules as overly protective and too expensive.[130] Congressman Stratton called a hearing, also in October, of the House Armed Services Subcommittee on Procurement and Military Nuclear Systems to discuss the effect of these and other recent EPA regulations on the United States weapons program.[131] He found the rules too costly and beyond the intent of Congress, and cautioned that "[i]f you set impossible standards for radiation, you are going to eliminate the possibility of producing nuclear weapons."[132] In addition, the Office of Management and Budget leveled a criticism of the risk-assessment techniques employed by the EPA in setting the regulations, and suggested that expensive control technologies should be required only in those plants where the corresponding public health benefit would be high.[133]

This criticism has forced the EPA to take a second look at the active mill tailings rules. EPA Administrator William Ruckelshaus has sought review of the scientific bases for the rules from the agency's Science Advisory Board.[134] The Board, which is expected to issue its response this spring,[135] will study the risk assessment strategies used in developing the

---

concern and express their displeasure over EPA's failures to promulgate these general environmental standards in a timely fashion.").

126. *Id.* at 3615.

127. 48 Fed. Reg. 45926 (1983). While the publication date was not until October 7, the official announcement of the rule was on September 30. *See* 14 ENV'T REP. (BNA) 948 (Oct. 7, 1983).

128. *See supra* notes 106-07 and accompanying text.

129. 14 ENV'T REP. (BNA) 948 (Oct. 7, 1983) (citing Environmental Defense Fund v. Ruckelshaus, No. 83-2039 (D.C. Cir. 1983)).

130. *Id.*

131. 14 ENV'T REP. (BNA) 984 (Oct. 14, 1983).

132. *Id.*

133. 14 ENV'T REP. (BNA) 1571, 1571-72 (Jan. 13, 1984).

134. 14 ENV'T REP. (BNA) 1439 (Dec. 16, 1983).

135. *See* 14 ENV'T REP. (BNA) 1756 (Feb. 10, 1984).

standards and will re-evaluate data used to estimate the extent of environmental contamination caused by the tailings.[136] For the present then, the state of uranium mill tailings regulation remains uncertain. Until the Science Advisory Board study is complete, and the various law suits are resolved, the final regulatory structure for mill tailings control will be unknown. And until this regulatory structure is in place, sources will remain subject to NRC licensing, with restrictions imposed on a case-by-case basis.[137]

C. *The Clean Air Act*

Under the Clean Air Act,[138] the EPA has had the authority since 1977 to regulate radioactive air pollutants, including radionuclide emissions from uranium mines and mills.[139] For NRC-licensed facilities, however, this responsibility is shared with the NRC. Under the terms of a 1980 agreement, the EPA will promulgate standards for emissions limitations with NRC assistance, and the NRC will implement and enforce the standards for its licensees.[140] Standards for uranium mines which are not subject to NRC licenses are to be promulgated by the EPA[141] and enforced either by the EPA or the corresponding state agency responsible for air pollution control.[142]

Emission standards for airborne radionuclides have undergone a regulatory process equally as convoluted as that for the standards for mill tailings. The Clean Air Act required the EPA, in 1977, to study radioactive pollutants to determine the extent of their hazard to public health.[143] At the completion of that study in December, 1979, the EPA found that exposure to radionuclides increased the risk of human cancer and genetic damage, and announced its intention to regulate radionuclides as a section 112 hazardous air pollutant.[144]

Under section 112 of the Clean Air Act, the EPA administrator is required to develop National Emission Standards for Hazardous Air Pollutants (NESHAPs) for emissions "which cause or contribute to air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating revers-

---

136. 14 ENV'T REP. (BNA) 1439 (Dec. 16, 1983).

137. *See supra* note 122 and accompanying text.

138. Pub. L. No. 91-604, 84 Stat. 1676 (1970), as amended by Pub. L. No. 95-95, 91 Stat. 685 (1977) (codified as amended at 42 U.S.C. §§ 7401-7642 (Supp. V 1981)).

139. 42 U.S.C. § 7422 (Supp. V 1981); 48 Fed. Reg. 15076 (1983).

140. *Memorandum of Understanding*, 45 Fed. Reg. 72981 (1980).

141. *See* 48 Fed. Reg. 15076 (1983).

142. *See, e.g.*, VA. CODE ANN. §§ 10-17.9:1 to .30:1 (Repl. Vol. 1978 & Cum. Supp. 1984).

143. 42 U.S.C. § 7422 (Supp. V 1981).

144. 44 Fed. Reg. 76738 (1979).

ible, illness."[145] The emission standards for radionuclides were supposed to be issued within 180 days of their designation as hazardous.[146] In June, 1981, the Sierra Club filed suit to compel the EPA to issue the NESHAP for radionuclides. A federal district court ruled on September 30, 1982, that the EPA must issue proposed rules within 180 days.[147] The EPA regulations were proposed on this court-imposed deadline: March 29, 1983.[148]

The EPA proposed regulations cover emissions only from underground uranium mines. Surface mines, which emit radon in smaller quantities and in a more dilute concentration, are exempt.[149] Likewise, uranium mills and mill tailings are not covered by the new rules.[150] The EPA proposal found that technological controls for reducing radon emissions are not feasible, and therefore set an indirect emission standard that encourages greater dilution and dispersion of the radioactive pollutant.[151] The standard restricts the increase in the average annual concentration of radon-222 (in areas not owned or operated by the mining company) to 0.2 picocuries per liter.[152] The EPA suggests this standard can be met in one of three ways: by "(1) reducing the percentage of time the mine operates, (2) increasing the effective height of the release, [or] (3) controlling additional land."[153] The EPA proposal suggests that mines can probably comply with the standard by controlling all land within two kilometers of the mine ventilation shafts.[154]

Attacks on the proposed regulations began in June, 1983, when the FMC Corporation complained to the EPA that it had failed to submit the air-borne radionuclide proposal and its scientific basis to the Science Advisory Board, in violation of the Environmental Research, Development, and Demonstration Act of 1978.[155] In September, the Defense Department and the Department of Energy, both of which operate facilities covered by the regulations, challenged the health basis of the rules, declaring

145. 42 U.S.C. § 7412 (Supp. V 1981).

146. *Id.*

147. Sierra Club v. Gorsuch, 551 F. Supp. 785 (N.D. Cal. 1982). *See also* 48 Fed. Reg. 15077 (1983).

148. 13 ENV'T REP. (BNA) 2180 (April 1, 1983); 48 Fed. Reg. 15076, 15088 (1983). The EPA objected to the court-imposed deadline, stating in its background section to the proposal that the deadline forced the agency "to proceed with less information than it would like." 48 Fed. Reg. at 15077. The comment period, slated to expire on May 30, 1983, was extended to July 14, 1983. 48 Fed. Reg. 23665 (1983). The final rules have not yet been issued.

149. 48 Fed. Reg. 15083 (1983).

150. 48 Fed. Reg. 15087 (1983).

151. 48 Fed. Reg. 15078, 15083-84 (1983).

152. 48 Fed. Reg. 15078, 15089 (1983) (to be codified at 40 C.F.R. § 61.142). A picocurie is one-trillionth of a curie. *See supra* note 86.

153. 48 Fed. Reg. 15084 (1983).

154. *Id.*

155. 14 ENV'T REP. (BNA) 261, 261-62 (June 17, 1983).

the standards were unreasonably stringent, while environmental groups asserted that the rules were too weak to protect public health adequately.[156] The House Armed Services Subcommittee on Procurement and Military Nuclear Systems reviewed these rules, as well as those promulgated under UMTRCA, and complained that the radionuclide standards were unnecessarily restrictive, were too costly, and would have a detrimental impact on the nuclear weapons program and national security.[157] The EPA responded to this criticism by forwarding the NESHAP rules to the Science Advisory Board for that body to review the air regulations along with those promulgated for mill tailings.[158]

The Science Advisory Board's findings on the proposed rules are scheduled to be issued in the spring of 1985. In the meantime, the EPA has been strongly criticized by the Office of Management and Budget for the risk assessment and cost effectiveness analyses used by the EPA to set NESHAP's.[159] Money has been allocated for EPA's 1985 budget to improve future risk assessment strategies for hazardous pollutants.[160] The controversy over these rules is far from settled; the Sierra Club filed suit in February, 1984, to force the EPA to issue its final NESHAP rules for radionuclide emissions.[161]

Until final rules are promulgated, radioactive emissions from uranium mines remain unregulated. Milling emissions are controlled by EPA standards promulgated under the Atomic Energy Act, which require mills to use the "best available technology" (BAT) to limit the annual dose equivalent of radionuclides to nearby individuals to twenty-five millirems per year.[162] New source standards issued by the EPA for metallic mineral processing plants cover particulate emissions, including trace amounts of radioactive pollutants, from the later stages of the uranium milling operation, where the concentrated uranium is dried into yellowcake and packaged for shipping.[163] Radioactive emissions from uranium mills are cur-

---

156. 14 ENV'T REP. (BNA) 728, 728-29 (Sept. 2, 1983).

157. 14 ENV'T REP (BNA) 984 (Oct. 14, 1983). *See supra* notes 131-32 and accompanying text.

158. 14 ENV'T REP. (BNA) 1439 (Dec. 16, 1983); 14 ENV'T REP. (BNA) 1756 (Feb. 10, 1984).

159. 14 ENV'T REP. (BNA) 1571, 1571-72, 1593 (Jan. 13, 1984).

160. 14 ENV'T REP. (BNA) 1716 (Feb. 3, 1984).

161. 14 ENV'T REP. (BNA) 1948 (Mar. 9, 1984) (citing Sierra Club v. Ruckelshaus, No. C84-06560-WHO (N.D. Cal. 1984)).

162. 40 C.F.R. pt. 190 (1983). A millirem is one-thousandth of a rem (roentgen equivalent man), "an unofficial, but widely used, unit of measure for the dose of ionizing radiation that gives the same biological effect as one roentgen of x-rays." R. LIPSCHUTZ, RADIOACTIVE WASTE 212 (1980).

163. 49 Fed. Reg. 6458 (Feb. 21, 1984). These new standards exempt uranium mining and milling operations up to and including "benefication" (reduction or concentration) of the ore. For a general description of the milling process, see CONSULTANTS' REPORT, *supra* note 10, at 41-46.

rently being studied for future, more stringent, regulation as a Hazardous Air Pollutant under the Clean Air Act's section 112. These regulations, however, would not be issued before 1985 or 1986.[164]

D. *The Clean Water Act*

Releases of radioactive pollutants into surface water are regulated by both the EPA and the NRC. The EPA, under the authority of the Clean Water Act,[165] sets industrial discharge limits on the levels of pollutants contained in each industry's effluent. Pollutants covered under the Act include radioactive materials,[166] but the EPA Administrator, when adopting regulations, specifically excluded all "source, byproduct, and special nuclear material" covered by the Atomic Energy Act.[167] This exclusion was challenged in 1976 in *Train v. Colorado Public Interest Research Group*,[168] but the Supreme Court upheld the Administrator's action, saying that Congress clearly intended for the NRC to maintain sole control over the emissions of its licensees.[169]

The NRC regulates radioactive discharges by its licensees by setting a maximum permissible release level.[170] In addition to compliance with this effluent limitation, licensees are encouraged to "make every reasonable effort to maintain radiation exposures, and releases of radioactive materials in effluents to unrestricted areas, as low as is reasonably achievable."[171]

The EPA regulatory system under the Clean Water Act covers only those radioactive discharges which do not fall into the "source, byproduct, and special nuclear material" category. The Clean Water Act mandates the control of discharges from both new and existing point

---

164. 14 ENV'T REP. (BNA) 1824 (Feb. 24, 1984).

165. Federal Water Pollution Control Act, Act of June 30, 1948, ch. 758, 62 Stat. 1155, as amended by Pub. L. No. 92-500, 86 Stat. 896 (1972) (codified as amended at 33 U.S.C. §§ 1251-1376 (1982)).

166. 33 U.S.C. § 1362(6) (1982).

167. *See* Train v. Colorado Pub. Interest Research Group, 426 U.S. 1, 8 (1976).

168. *Id.*

169. The reasoning of the Court was that the FWPCA encourages the development of state permit programs and allows the setting of more stringent state effluent limitations. The Atomic Energy Act, on the other hand, "created a pervasive regulatory scheme, vesting exclusive authority to regulate the discharge of radioactive effluents from nuclear power plants [and other NRC licensees] in the AEC [NRC] and preempting the States from regulating such discharges." *Id.* at 16, (citing Northern States Power Co. v. Minnesota, 447 F.2d 1143 (8th Cir. 1971), *aff'd*, 405 U.S. 1035 (1972)). *See also* Hallmark, *supra* note 63.

170. 10 C.F.R. § 20.106 & pt. 20, app. B (1983).

171. 10 C.F.R. § 20.1(c) (1983). "As low as is reasonably achievable" implies a balancing test, "taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, . . . in relation to the utilization of atomic energy in the public interest." *Id.*

sources by requiring sources to obtain permits for any discharge.[172] Under a complex regulatory scheme, the Act requires existing sources to comply with a "best practicable control technology currently available" (BPT) standard by 1977, but to meet a stricter "best available technology economically achievable" (BAT) standard by July 1, 1984.[173] New sources of pollution are subject to the strictest regulation and must achieve the "greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology (BADT) . . . including, where practicable, a standard permitting no discharge of pollutants."[174] The final category of regulations includes limits on "conventional" pollutants such as oil, grease, coliform bacteria, total suspended solids (TSS), and pH. In this category, a "best conventional pollutant control technology" (BCT) standard replaces the BAT standard for effluent limitation.[175]

Currently, the EPA has set BPT limits on discharges from *existing* uranium mines and milling operations. The regulations set limits on discharges of uranium, radium, zinc, COD, TSS, and pH from mine drainage,[176] and on discharge from mills of TSS, COD, arsenic, zinc, ammonia, radium, and pH.[177]

In December, 1982, the EPA revised these effluent limitations, adding BAT standards to be met by existing mines by July, 1984, and setting New Source Performance Standards (NSPS) for both mines and mills.[178] The new BAT standards,[179] which existing mines are to meet by 1984, add in situ leach mining to the sources covered, but otherwise leave the effluent limitations for COD, zinc, radium, and uranium unchanged from the earlier BPT effluent limitations. Likewise, the BADT standard for new uranium mines is identical to the current BPT standard applied to

---

172. 33 U.S.C. § 1342(a) (1982). The National Pollutant Discharge Elimination System (NPDES) permit system is handled in Virginia by the State Water Control Board. VA. CODE ANN. § 62.1-44.15 (Repl. Vol. 1982 & Cum. Supp. 1983).

173. 33 U.S.C. § 1311 (1982). *See also* 47 Fed. Reg. 54599 (1982).

174. 33 U.S.C. § 1316 (1982).

175. *Id.* § 1311(b)(2)(E). *See also* Proposed EPA Rules, Best Conventional Pollution Control Technology; Effluent Limitation Guidelines, 47 Fed. Reg. 49176 (1982). Under these new guidelines, the cost to industry for reducing levels of conventional pollutants is compared to the cost to publicly owned treatment works for treating the same pollutant. A stringent "cost reasonableness" determination must be made in setting BCT limitations, which cannot be set higher than BPT limits.

176. 47 Fed. Reg. 54612 (1982) (to be codified at 40 C.F.R. § 440.32(a)). The standards do not include regulation of the pollutants copper, cadmium, lead, and mercury, which are "present in amounts too small to treat." *Id.* at 54608.

177. 47 Fed. Reg. 54612 (1982) (to be codified at 40 C.F.R. § 440.32(b)).

178. 47 Fed. Reg. 54598, 54612 (1982) (to be codified at 40 C.F.R. §§ 440.33-.34).

179. 47 Fed. Reg. 54612 (1982) (to be codified at 40 C.F.R. § 440.33). BAT limits were not issued for uranium mills since there is only one existing discharger and development of national regulations was felt to be unwarranted for a single plant. *Id.* at 54605-06.

existing mines.[180] A separate, stricter new source performance standard has been set for uranium mills and certain in situ mines, where no discharge of radioactive pollutants will be allowed.[181]

Under regulations proposed in 1982, TSS and pH from uranium mines and mills will be regulated under a separate category of "conventional" pollutants. The proposed BCT limits for these two pollutants are unchanged from the current BPT effluent requirements now in effect.[182] Final BCT limits for TSS and pH have not yet been issued by the EPA.

E. *The Safe Drinking Water Act*

Under the Safe Drinking Water Act,[183] the EPA has set interim primary drinking water standards for the protection of public health. These standards set maximum contaminant levels for both man-made and naturally-occurring radionuclides in public water systems,[184] and require periodic monitoring by municipalities. Both the interim maximum containment levels and the types of radionuclides regulated under the standards are currently being reviewed by the EPA. An advance notice of proposed rulemaking, discussing possible changes in the existing interim standards, was issued by the EPA in October, 1983.[185]

The Safe Drinking Water Act is aimed primarily at operators of public water systems, but could be invoked against operators of uranium mines and mills if seepage from containment ponds should result in the entry of in radioactive contaminants into public drinking water supplies. When-

---

180. 47 Fed. Reg. 54612 (1982) (to be codified at 40 C.F.R. § 440.34 (a)).

181. 47 Fed. Reg. 54612-13 (1982) (to be codified at 40 C.F.R. § 440.34 (b)(1)). This "zero discharge" regulation is not as burdensome as it might appear, since only one of the nineteen active uranium mills in the United States discharges its effluent into surface water. The other eighteen treat effluent by impoundment and evaporation. 47 Fed. Reg. 25697 (1982). In the event average rainfall in the area exceeds the evaporation rate or in the event of extraordinary precipitation, the excess mill effluent may be discharged subject to the mine effluent limitation. 47 Fed. Reg. 54603, 54613 (1982) (to be codified at 40 C.F.R. § 440.34 (b)(2)). In the final regulations, the EPA recognized that all current mills were in arid areas, where significant rainfall was not a factor. It commented that if a mill were to locate in a high precipitation area, such as Virginia, it could either take advantage of this "net precipitation provision and the storm exception," or could petition the EPA to develop a new sub-category for the facility. *Id.* at 54603.

182. The proposed BCT limits set out in 47 Fed. Reg. 25682 (1982) were superseded by new limits in 47 Fed. Reg. 49176 (1982) (to be codified at 40 C.F.R. § 440.35). The new formula for setting levels of conventional pollutants is outlined *supra* note 175. TSS (total suspended solids) refers to particles in water that can be removed by filtering, while pH is a measure of the acid or alkaline condition of water. M. LANDY, *supra* note 20, at 250, 259.

183. Pub. L. No. 93-523, 88 Stat. 1660 (1974) (codified as amended at 42 U.S.C. § 300f (1982).

184. 40 C.F.R. §§ 141.15-.16 (1983). See 40 Fed. Reg. 34324 (1975) for a discussion on the proposed maximum containment levels.

185. 48 Fed. Reg. 45502, 45519-21 (1983).

ever there is such an imminent or substantial threat to public health, "emergency" provisions in the statute allow the EPA to enjoin persons from introducing contaminants into the water system.[186]

In addition, the Safe Drinking Water Act controls groundwater contamination from in situ mining methods. An Underground Injection Control program, requiring permits for the operation of injection wells, prohibits any underground injection which could endanger groundwater sources.[187]

F. *Employee Protection*

Three different federal acts regulate employee exposure to ionizing radiation. The Mine Safety and Health Act of 1977 (MSHA)[188] sets health and safety standards for miners in coal, metal, and non-metallic mines, including uranium mines. The Atomic Energy Act[189] protects employees of NRC licensees in uranium mills. In addition, the Occupational Safety and Health Act of 1970 (OSHA) insures the safety of employees who work in areas not covered by the two other statutes.[190]

Under MSHA, comprehensive standards have been promulgated to protect underground miners from exposure to radon and its decay products. The regulations set a maximum yearly radon exposure of four "working level months," and require periodic air sampling, extensive record-keeping on employee exposure, and use of respirators in high-exposure areas.[191]

In the area of employee protection, OSHA begins coverage where MSHA coverage ends. OSHA regulates employee exposure to ionizing radiation[192] by a set of guidelines which mirror the NRC's Standards for Protection Against Radiation.[193] OSHA, however, exempts NRC licensees from coverage,[194] so only non-mill employees would be protected from radiation by OSHA regulation.

Mill employees are protected from radiation exposure by the NRC, through the exercise of its licensing authority. NRC licensees are required

186. 42 U.S.C. § 300i(a) (1982).
187. 42 U.S.C. § 300h (1982); 40 C.F.R. §§ 146.31-.35 (1983).
188. 30 U.S.C. §§ 801-962 (1982).
189. 42 U.S.C. § 2011 (1976 & Supp. V 1981).
190. 29 U.S.C. §§ 651-678 (1982). *See* Hallmark, *supra* note 63, at 790.
191. 30 C.F.R. §§ 57.5-37 to -47 (1983).
192. 29 C.F.R. § 1910.96 (1983).
193. 10 C.F.R. pt. 20 & app. B (1983).
194. 29 C.F.R. § 1910.96(p)(1) (1983) (employers possessing or using any source, by-product, or special nuclear material under license from the NRC in accordance with the 10 C.F.R. § 20 requirements "shall be deemed to be in compliance with the requirements of this section with respect to such possession and use.").

to meet federal guidelines limiting worker exposure, monitor radiation levels in all work areas, and maintain records on all individual exposure levels.[195]

These employee standards for protection against radiation have been criticized as ineffective. A 1980 study by the National Institute for Occupational Safety and Health (NIOSH) found that at the current MSHA four working level month standard, a miner's risk of cancer was doubled. NIOSH considered this to be a "major public health concern,"[196] but no move has been made to lower the standard to a safe level. The EPA is currently revising its federal guidance for occupational exposure to radiation, but uranium miners will be specifically excluded.[197]

G. *Resource Conservation and Recovery Act of 1976*

The Resource Conservation and Recovery Act (RCRA)[198] was enacted to control environmental problems resulting from hazardous waste dumping.[199] Under the RCRA, the EPA was given the authority to study the environmental impacts of uranium mining wastes and develop regulations to eliminate any hazards.[200] That study, however, is still in progress, and application of RCRA to mining wastes is suspended until the EPA report is issued.[201]

IV. State Regulation of Uranium Mining and Milling

A. *Introduction*

State regulation of uranium development has arisen in two contexts: either in the absence of federal regulation or in response to federal guidelines. If Virginia is to proceed with the licensing of uranium, the General Assembly and the Uranium Administrative Group should look closely at other states' regulatory systems to develop a framework for Virginia regulation. This section of the note will trace the uranium development process, examining both Virginia's existing administrative framework and alternative regulatory systems established by other states.

B. *Exploration*

Exploration for uranium can result in both land disturbances and

195. 10 C.F.R. § 20.103 (1983).

196. E. Bargman, Uranium; The Real Facts 2 (1982), *citing* NIOSH, The Risk of Cancer Among Underground Miners ii (1980).

197. 47 Fed. Reg. 48743 (1982).

198. 42 U.S.C. §§ 6901-6987 (1976 & Supp. V 1981).

199. 42 U.S.C. § 6902 (1976).

200. 42 U.S.C. §§ 6921, 6982 (Supp. V 1981).

201. Shaw Report, *supra* note 68, at 8. The EPA report was expected in October, 1983.

groundwater contamination.[202] Since no federal statutes directly address these problems, regulation is exclusively a state matter. Most state statutes focus on both protection of groundwater and surface reclamation. Virginia's new uranium exploration statute, however, addresses only the former. The 1982 General Assembly passed legislation giving the State Division of Mines authority to require permits for the exploration for uranium ore.[203] The applicant must post a bond to assure compliance with Division regulations relating to the drilling, plugging, and abandoning of drill holes.[204] The statute requires that drill holes be plugged as soon as reasonably practical, unless multiple aquifers are encountered, in which case the holes are to be plugged immediately.[205] The Virginia Administrative Process Act[206] applies to the statute and mandates a public notice and comment procedure for any setting of regulations or issuance of permits by the Division. The public's ability to make meaningful comments, however, is limited because the statute allows the Division to hold all logs, surveys, and reports submitted by the applicant confidential for two years.[207]

The Colorado statute governing uranium exploration employs a similar licensing scheme, but goes further than Virginia's. Like Virginia, Colorado provides regulations for filling drill holes to prevent artesian flows of groundwater[208] or fluid communication between aquifers.[209] In addition, however, the Colorado statute requires those applying for an exploration permit to reclaim the affected land and meet the statutory guidelines for mined land reclamation.[210]

---

202. *See supra* notes 20-23 and accompanying text.

203. VA. CODE ANN. §§ 45.1-272 to -285 (Cum. Supp. 1983).

204. *Id.* § 45.1-274(B). Exploration holes are to be plugged with cement from the bottom of the hole to a point three feet below plow depth. The remainder of the hole is to be filled with "cuttings or nontoxic materials." *Id.* § 45.1-277(1).

205. *Id.* § 45.1-277(2)-(3).

206. *Id.* §§ 9-6.14:1 to .14:21 (Repl. Vol. 1978 & Cum. Supp. 1983). *See also id.* § 45.1-281 (Cum. Supp. 1983) ("The provisions of the Administrative Process Act . . . shall be applicable to the provisions of this chapter.").

207. *Id.* § 45.1-285. Extensions of the two year period can be obtained by a written request to the Division. The Chief of the Division will grant any request certified "to be of a proprietary nature relating to [the applicant's] competitive rights." *Id.*

208. An artesian flow of groundwater is "groundwater under sufficient pressure to rise above the level at which the water-bearing rock is reached in a well." M. LANDY, *supra* note 20, at 220.

209. COLO. REV. STAT. § 34-32-113(5.5)(b)-(f) (Cum. Supp. 1983).

210. *Id.* § 34-32-113(5.5)(b)(V). "Each drill hole shall be reclaimed pursuant to § 34-32-116, including, if necessary, reseeding if grass or any other crop was destroyed." *Id.* The Colorado statute, *id.* § 34-32-116, outlines the duties of an operator to reclaim lands affected by mining. These requirements, implemented in 1974, predate the federal Surface Mining Control and Reclamation Act, *infra* note 251. Colorado enacted these provisions, covering both exploration and mining, as part of its first comprehensive land use law. Bermingham, *1974 Land Use Legislation in Colorado*, 51 DEN. L.J. 467, 468, 490-91 (1974).

The most comprehensive legislation covering uranium exploration is found in South Dakota where uranium mining has been a hotly debated political issue.[211] The South Dakota Uranium Exploration Act requires anyone wishing to explore for uranium to file an application for a permit with the Board of Minerals and Environment. Detailed application requirements include submitting a map and a reclamation plan (to restore the land as nearly as possible to its original condition),[212] and conducting water testing on nearby domestic water wells.[213] In contrast to Virginia's confidential treatment of exploration data,[214] South Dakota requires the applicant to file this information with the local register of deeds, where it is available for public inspection.[215]

The South Dakota Department of Fish, Game and Parks and the State Archaeologist both review the permit applications and may add terms and conditions necessary to protect riparian habitats or archaeological sites.[216] Surface owners are given an opportunity, during preparation of the applicant's plan, to designate preferences for reclamation of the land.[217] Any person can file a written objection, a statement in support, or a petition for hearing on the application.[218] The Board must hold a public hearing before a permit will be granted.[219] Once exploration has begun, test holes are to be capped, sealed, or plugged pursuant to rules adopted by the Board.[220]

C. *Mining and Milling*

State regulation of mining and milling operations is usually carried out in furtherance of the objectives of the Clean Water Act and the Clean Air Act.[221] States which develop plans compatible with these federal statutes can assume the regulatory programs mandated by the Acts, and can, if necessary to protect the State's environment, enact regulations more stringent than those required by the EPA.

---

211. In 1980, a South Dakota voter initiative to require a statewide vote on any exploration, mining, or milling failed by a narrow margin. An interim study committee of the legislature is currently developing legislation on mining. Piedmont Environmental Council, *Responses to Uranium Exploration in Other Parts of the Country* (1981) (P.E.C. Fact Sheet).

212. S.D. CODIFIED LAWS ANN. §§ 45-6D-6 to -10, 45-6D-38 (1983).

213. *Id.* § 45-6D-17.

214. *See supra* note 207 and accompanying text.

215. S.D. CODIFIED LAWS ANN. § 45-6D-11 (1983). The only information held confidential by the Board is that relating to location of test holes. *Id.* § 45-6D-15.

216. *Id.* §§ 45-6D-13 to -14.

217. *Id.* § 45-6D-16.

218. *Id.* §§ 45-6D-26 to -28.

219. *Id.* §§ 45-6D-28 to -31.

220. *Id.* §§ 45-6D-33 to -36.

221. *See supra* notes 138-82 and accompanying text.

1. Water Pollution Control

Surface water pollution from uranium mines and mills is federally controlled through both the permit requirements of the Nuclear Regulatory Commission (NRC) and the National Pollutant Discharge Elimination System (NPDES) permit system mandated by the Clean Water Act.[222] In Virginia, the latter program is administered by the State Water Control Board (SWCB).[223]

NPDES permits set the pollutant discharge limitations developed by Virginia's SWCB for individual applicants. The SWCB standard must be at least as stringent as the current standards promulgated by the EPA for uranium mines and mills.[224] If, however, the uranium mine-mill complex is located on a river designated by the SWCB as "water quality limited" (where the waters are cleaner than the national water quality standards), the SWCB *could* require discharge standards more stringent than the EPA's in order to preserve water quality.[225]

Federal NPDES permit requirements cover only surface water contamination from mine dewatering, milling wastewater, and tailings pond effluent. The permit program fails to address groundwater contamination from tailings pond seepage.[226] In Virginia, this problem could be handled through the SWCB's "No-Discharge Certification" program, an independent state scheme which governs potential or indirect discharges to state waters.[227] Under this program, the state could regulate groundwater seepage in the absence of EPA action[228] and could assure the maintenance of groundwater quality in the tailings pond area. A no-discharge certification could also fill another gap in the Clean Water regulations and control run-off from non-point sources such as mining overburden,[229] ore stockpiles, or tailings disposal facilities.[230]

Several states have specifically addressed the problem of groundwater contamination by uranium operations. Colorado makes it unlawful for a mill to discharge radioactive wastes underground unless the state Water

---

222. *See supra* notes 165-69 and accompanying text.

223. VA. CODE ANN. § 62.1-44.15 (Repl. Vol. 1982).

224. Va. State Water Control Board Rule 6.15 (1980).

225. 33 U.S.C. § 1313(d) (1982); Va. State Water Control Board Rule 6.15(n) (1980).

226. *See, e.g., EPA Finds "Intolerable" Radioactivity in Drinking Water Near Uranium Mines*, 6 ENV'T REP. (BNA) 651 (Aug. 22, 1975); Polsgrove, *supra* note 21.

227. VA. CODE ANN. § 62.1-44.16 (Repl. Vol. 1982); State Water Control Board Procedural Rule 2.04(a)(1)(A) (1980).

228. *See supra* notes 134-37 and accompanying text.

229. *See infra* notes 248-50 and accompanying text.

230. Current NRC permit requirements suggest that tailings be buried below-grade, in trenches lined with a clay or synthetic liner in order to eliminate seepage or to reduce it to the maximum extent reasonably attainable. SWANSON PROJECT REPORT, *supra* note 24, § 5.0. *But see supra* notes 121-24.

Quality Control Division finds (as a condition of permit issuance) that no significant pollution would result and that no wastes would migrate from the area.[231] Permit requirements are keyed to future regulations under the federal Uranium Mill Tailings Radiation Control Act:[232] if these federal regulations are consistent with the Colorado statute, no state discharge permit will be required.[233] This allows Colorado to impose more stringent requirements through its permit scheme if federal regulations fail to protect groundwater quality.

Montana takes a different approach, creating a statutory cause of action for damages to water supplies.[234] Any person who obtains water from an underground source "may sue an operator to recover damages for contamination, diminution, or interruption of the water supply, proximately resulting from strip mining or underground mining."[235]

2. Air Pollution Control

Air pollution from the mining and milling operation would be controlled in Virginia by both federal and state regulatory authority. Emissions of radionuclides from *mills* are controlled by the NRC through its licensing authority,[236] while *mining* emissions are controlled by the state pursuant to EPA guidelines.[237] While no state has directly addressed air contamination from uranium operations, all have state agencies responsible for promulgating and enforcing regulations consistent with the radionuclide emission limits set by the EPA and the NRC.

The regulation of mining effluents (primarily dust and radionuclides) is carried out by these state agencies. In Virginia, the State Air Pollution Control Board (SAPCB)[238] will control mining emissions through the issuance and enforcement of SAPCB and "PSD" permits. The SAPCB permit, which must be obtained before construction of the mine "commences,"[239] should contain the newly proposed EPA emission standard for radionuclides.[240] After the final emission standard is promulgated, the

231. COLO. REV. STAT. § 25-8-506 (Repl. Vol. 1982).

232. Uranium Mill Tailings Radiation Control Act of 1978, Pub. L. No. 95-604, 92 Stat. 3021 (1978) (amending the Atomic Energy Act of 1954, 42 U.S.C.A. 2011-2296).

233. COLO. REV. STAT. § 25-8-506(3) (Repl. Vol. 1982).

234. MONT. CODE ANN. § 82-4-253 (1983).

235. *Id.*

236. 10 C.F.R. § 20.1(c) & app. B (1983); 40 C.F.R. § 190.10 (1983). *See supra* notes 138-64 and accompanying text.

237. *See infra* notes 238-44.

238. VA. CODE ANN. §§ 10-17.9:1 to .30:1 (Repl. Vol. 1978 & Cum. Supp. 1984).

239. State Air Pollution Control Board Reg. § 2.33(a)(1). The word "commences" here means not only physical construction, but also the entering into of binding contractual obligations for the construction job. State Air Pollution Control Board Reg. § 1.02.

240. State Air Pollution Control Board Reg. § 2.339(d)(3). *See supra* notes 138-64 and accompanying text.

SAPCB can prohibit construction or operation of the mine unless the mining company meets the technology-based "best available control technology" (BACT) guidelines[241] and assures that the mine will not violate the emission standard. If construction is commenced *before* promulgation of the EPA emission standard, the SAPCB would set its own emission limitation based on a BACT standard.[242] The state standard can be stricter than that of the EPA,[243] and can contain additional limitations not required by the EPA on visible emissions and fugitive dust generated by the mining process.[244]

The mining operation may also need a PSD (prevention of significant deterioration) permit, which is required for any new source planned for areas like Pittsylvania County, where the air is cleaner than the National Ambient Air Quality Standard.[245] Under the Clean Air Act's definition, the proposed mine would be a "major" source subject to SAPCB permitting requirements if it has the potential to emit more than 250 tons per year of certain named pollutants.[246] As a major source, the mine would have to meet the BACT standards before a permit would be issued.[247]

D. *Mined Land Reclamation*

Surface mining for uranium involves the removal of large quantities of earth (called overburden) before the minable ore is reached. The ratio of overburden to ore in a mining operation can range from 8:1 to 35:1.[248] These piles of earth contain radioisotopes[249] and could create problems with both ground and surface water contamination and with stream siltation.[250] To avoid these problems, provisions must be made to prevent ero-

---

241. State Air Pollution Control Board Reg. § 6.22(c).

242. State Air Pollution Control Board Reg. §§ 5.42, 5.30-.31.

243. The current SAPCB regulations now provide that "an owner may not permit discharges of any hazardous air pollutant in such quantities as to cause ambient air concentrations that may cause, or contribute to, a harmful effect." State Air Pollution Control Board Reg. § 6.22(a).

244. State Air Pollution Control Board Reg. § 5.13.

245. All areas of Virginia are subject to the PSD permit program except Northern Virginia, Richmond, and Tidewater, where NAAQS's for ozone have been exceeded and a stricter permit system is in effect.

246. 42 U.S.C. § 7479 (Supp. V 1981). The mine would need a PSD permit *if* emissions of sulfur dioxide, carbon monoxide, nitrogen oxides, ozone, particulates, or lead exceed the statutory limit. The type and quantity of emissions would depend on the type of mining conducted and the mining machinery used.

247. 42 U.S.C. § 7475(a) (Supp. V 1981).

248. PEC REPORT, *supra* note 21, at 5. The ratio for the Pittsylvania mine is projected to range from 1:1 to 13:1. SWANSON PROJECT REPORT, *supra* note 24, § 3.6.

249. The depth of soil and saprolite (disintegrated rock) covering the Pittsylvania County deposit averages thirty-five feet. The soil in places contains isotopes of uranium. SWANSON PROJECT REPORT, *supra* note 24, §§ 2.0, 3.1, 6.5.

250. PEC REPORT, *supra* note 21, at 28-29.

sion and seepage from the overburden piles while mining is in progress, and to reclaim the affected land after mining is completed.

No federal regulations address these problems. The federal Surface Mining Control and Reclamation Act of 1977[251] covers only coal operations. Under the Resource Conservation and Recovery Act (RCRA)[252] the EPA has the authority to develop regulations to eliminate any hazards caused by uranium mining wastes, but to date has taken no action.[253]

Virginia has minimal state requirements for reclamation of land mined for minerals other than coal. Applicants for general mining permits are required to submit a reclamation plan to the Department of Conservation and Economic Development.[254] Under a 1968 statute governing the surface mining of minerals other than coal, land must be restored to "surface that is suitable for the proposed subsequent use of the land after reclamation is completed."[255] These requirements will not be sufficient to control the problems unique to uranium mining where the overburden could contain radioactive contaminants. Regulations specifically addressing overburden management must be promulgated to assure containment of radionuclides and to prevent run-off and stream siltation.[256] In addition, the pit left by the mining operation will require special treatment to line the hole and prevent contamination of the accumulating groundwater and precipitation.[257] Permanent restrictions on future use of the site may be found necessary.[258]

Many uranium mining states have expanded their mine reclamation statutes to address these concerns.[259] Possibly the most comprehensive is

---

251. 30 U.S.C. § 1201 (1982).

252. 42 U.S.C. § 6901 (1976 & Supp. V 1981).

253. *See supra* notes 198-201 and accompanying text.

254. VA. CODE ANN. § 45.1-182.1 (Repl. Vol. 1980). "The plan must be prepared to meet drainage, erosion, and sediment control criteria, in addition to revegetation and stabilization standards." SWANSON PROJECT REPORT, *supra* note 24, § 3.9. Overburden piles are to be sloped, covered with topsoil, and revegetated to "blend with the natural surroundings." *Id.* § 3.17.

255. VA. CODE ANN. § 45.1-182.1 (Repl. Vol. 1980).

256. Because of the nature of open-pit mining, which advances in depth (rather than advancing horizontally as in a strip mine), backfilling the mine with overburden material is not possible. In the proposed Virginia mine, the material removed from the pit, containing waste rock and "sub-economic" ore, would be permanently disposed of in an overburden storage area adjacent to the pit. SWANSON PROJECT REPORT, *supra* note 24, §§ 3.7, 3.8, 3.16.

257. CONSULTANTS' REPORT, *supra* note 10, at 30. The proposed mine is estimated to cover a surface area of 110 acres. SWANSON PROJECT REPORT, *supra* note 24, § 3.7.

258. CONSULTANTS' REPORT, *supra* note 10, at 39. *Cf.* SWANSON PROJECT REPORT, *supra* note 24, § 3.9 (suggesting that the area could possibly be used for agricultural and recreational purposes after groundwater fills the pit).

259. *See, e.g.*, Colorado Mines Land Reclamation Act, COLO. REV. STAT. ANN. §§ 34-32-101 to -125 (Cum. Supp. 1983); Montana Strip and Underground Mine Reclamation Act, MONT. CODE ANN. §§ 82-4-201 to -254 (1983); OR. REV. STAT. §§ 517.905-.990 (Repl. Pt. 1983).

the Texas Uranium Surface Mining and Reclamation Act.[260] Texas, which ranks third in the United States in uranium production,[261] enacted legislation similar in structure to the federal Surface Mining Control and Reclamation Act.[262] The Texas act expressly covers reclamation of uranium mines and clearly outlines the duties of a mine operator with reference to reclamation standards.[263] A reclamation plan, liability insurance, and a performance bond are all required before the Texas Railroad Commission will issue a surface mine permit. The permit will be denied if air or water rules are violated, or if the land is found unsuitable for uranium mining.[264]

E. *Mill Tailings Control*

Under the Uranium Mill Tailings Radiation Control Act (UMTRCA), states can play a cooperative role with the federal government by assuming "Agreement State" status.[265] As an agreement state, a state can take over regulation of uranium mill tailings and can enact rules equivalent to or more stringent than those required by the NRC and the EPA.[266] State action may be preempted, however, if the state regulations are enacted for the sole purpose of protection against regulation—an area expressly reserved for the federal government by the Atomic Energy Act.[267]

The current regulatory confusion over mill tailings control[268] has left states in limbo. As a result, there is no consistent pattern of state responses to the Act. Several states have addressed only the title I remedial cleanup goals.[269] Pennsylvania, for example, has a statutory provision authorizing the state Department of Environmental Resources to cooperate with the federal government in remedial cleanup operations at an abandoned mill site in Cannonsburg.[270] Utah, likewise, addresses only title I of the UMTRCA by authorizing the state Department of Health to enter into cooperative agreements with the federal Department of Energy for the acquisition and cleanup of abandoned mill sites. Active mill sites are

---

260. TEX. NAT. RES. CODE ANN. §§ 131.001-.270 (Vernon 1978 & Cum. Supp. 1984).

261. Newton & Sherman, *The Evolution of Control of Surface Mining of Coal and Uranium in Texas*, 29 BAYLOR L. REV. 847, 854 (1977).

262. *See supra* note 251.

263. TEX. NAT. RES. CODE ANN. §§ 131.004(1), 131.102(b) (Vernon Cum. Supp. 1984).

264. *Id.* §§ 131.101-.141 (Vernon 1978 & Cum. Supp. 1984).

265. *See supra* notes 71-77 and accompanying text.

266. *See supra* note 77 and accompanying text.

267. *See* Pacific Gas & Elec. Co. v. State Energy Resources Conservation & Dev. Comm'n, 103 S. Ct. 1713, 1725-26 (1983); Northern States Power Co. v. Minnesota, 447 F.2d 1143 (8th Cir. 1971), *aff'd*, 405 U.S. 1035 (1972).

268. *See supra* notes 104-37 and accompanying text.

269. 42 U.S.C. § 7901 (1976 & Supp. V 1981).

270. PA. STAT. ANN. tit. 71, § 510-4.1 (PA. ADM. CODE § 1904-A.1) (Purdon Supp. 1983-84).

not mentioned.[271]

Colorado legislation goes further, declaring that both active and inactive mill operations pose "a potential and significant radiation health hazard [necessitating legislation to provide] for the stabilization, disposal, and control of such tailings in a safe and environmentally sound manner."[272] The statute authorizes Department of Health participation in remedial cleanup programs of UMTRCA's title I, but fails to specify a state role under title II for implementing regulations for active mill sites.[273]

Only five states (Arizona, New Mexico, Nevada, Oregon, and Washington) directly address tailings management by active mills. All but Oregon pattern their statutes after title II of the UMTRCA. The UMTRCA requires stabilization and reclamation of mill tailings disposal sites,[274] and decontamination and decommission of the mills after closure. A mill must comply with these requirements before the NRC will issue an operating license. The Act also requires bonds to assure proper disposal. After the mill is closed and the tailings are stabilized, ownership of the affected land is to be transferred to the state or federal government for long-term monitoring and control.[275]

All of the UMTRCA elements discussed above appear in Arizona's uranium mill licensing program. The mill licensee must develop a plan for management, control, stabilization, and disposal of the tailings, and for decommission of the mill. Licensees must post financial security to assure performance, and must contribute to a "radiation regulatory and perpetual care fund."[276] The fund is held in trust by the state for continued

---

271. UTAH CODE ANN. §§ 26-1-27 to -29 (Supp. 1983).

272. COLO. REV. STAT. § 25-11-301 (Repl. Vol. 1982).

273. *Id.* § 25-11-303. *See* Sunflower Coalition v. NRC, 534 F. Supp. 446 (D. Colo. 1982) (where a challenge to Colorado's agreement state regulation of uranium mill tailings was dismissed for lack of subject matter jurisdiction).

274. "Stabilization" and "reclamation" refer to the disposal of mill tailings in a manner which isolates the tailings from groundwater sources and reduces the potential for erosion, disruption, and dispersion of tailings by natural forces. NRC disposal guidelines suggest below-grade disposal in trenches lined with clay or synthetic material (to prevent seepage) and covered with at least three meters of topsoil to reduce radon emissions. The trenches should be planted with groundcover or covered with rock to prevent erosion. NRC Uranium Mill Licensing Requirements, 45 Fed. Reg. 65521, 65523-24 (1980) (to be codified at 10 C.F.R. pts. 30, 40, 70, & 150).

275. Pub. L. No. 95-604, §§ 201-04, 92 Stat. 3021, 3033-38 (1978); Grammer, *supra* note 28.

276. ARIZ. REV. STAT. ANN. § 30-695(A)(1) (Supp. 1983). A licensee's annual contribution to the fund must equal

> [t]he net worth of the fund required to produce the investment earnings sufficient to pay the cost of maintenance and surveillance of the lands, buildings, grounds and radioactive waste materials to be conveyed to the state [upon closure of the facility] . . ., less the net worth of all payments previously made by the licensee to the agency for such purposes, divided by the number of years the licensed activity is reasonably expected to continue.

Id.

maintenance and surveillance after the mill has closed down.[277]

The New Mexico statute[278] is similar, giving the Environmental Improvement Board the authority to license mills, develop regulations on radiation protection and continued care activities, and to establish a "continued care fund." The statute empowers the Board to adopt regulations "more stringent than those of the Nuclear Regulatory Commission upon the finding that such regulations are necessitated by unique or special circumstances in New Mexico."[279]

In Nevada,[280] the state Board of Health is responsible for the licensing of mills, and is charged with the development of standards for decommission, decontamination, and reclamation which are at least as stringent as the NRC's. Before a license is granted the Board must provide an environmental impact analysis[281] and hold a public hearing on the permit applications. Nevada requires that "[m]anagement of byproduct material [tailings] must conform to the applicable standards of the Nuclear Regulatory Commission which are in effect on July 1, 1981."[282]

The Washington "Mill Tailings Licensing and Perpetual Care Act of 1979"[283] closely follows the pattern of the other three states. The State Department of Social and Health Services requires licensees to develop a "plan for the reclamation and disposal of tailings and for decommissioning the site that conforms to the criteria and standards then in effect for the protection of the public safety and health."[284] A public hearing on the adequacy of the plan must be held. The statute creates a "radiation perpetual maintenance fund" to be used for decommissioned sites which re-

---

277. *Id.* §§ 30-691 to -696.

278. N.M. STAT. ANN. §§ 74-3-1 to -16 (Repl. Pamphlet 1981).

279. *Id.* § 74-3-6(D) *See* Kerr-McGee Nuclear Corp. v. New Mexico Envtl. Improvement Bd., 97 N.M. 88, 637 P.2d 38 (1981) (where the validity of two EIB regulations on radiation protection was challenged on procedural grounds).

280. NEV. REV. STAT. §§ 459.300-.370 (1983).

281. This analysis must include "an assessment of the radiological and nonradiological effects on the public health; . . . [a]n assessment of any effect on any waterway and groundwater; . . . [a] summary of any alternatives to the activity being considered; and . . . [a] summary of the long-term effect of the activity." *Id.* § 459.320. States assuming the NRC's licensing of uranium mills are required to prepare a written analysis of the effects of mill activities on the environment. *See supra* note 77 and accompanying text; Grammer, *supra* note 28, at 498. The analysis need not be as detailed as the Environmental Impact Statement which the NRC must compile before making a licensing decision. Manygoats v. Kleppe, 558 F.2d 556 (10th Cir. 1977); 10 C.F.R. § 51.5(b) (1983); Grammer, *supra* note 28, at 474.

282. NEV. REV. STAT. § 459.360 (1983). *See also* NRC criteria relating to the operation of uranium mills and the disposition of tailings or waste, 10 C.F.R. pt. 40, app. A (1983).

283. WASH. REV. CODE ANN. §§ 70.121.010-.910 (West Supp. 1983-84).

284. *Id.* § 70.121.030(1)(a).

quire further maintenance, surveillance, or other care.[285]

The only state to deviate significantly from the UMTRCA model is Oregon.[286] Oregon requires anyone seeking to construct or operate a uranium mill or tailings facility to obtain a site certification from the State Energy Facility Siting Council, following the same procedures used for siting nuclear power plants. The Council has a broad mandate: not only must it perform all acts necessary to implement the UMTRCA,[287] but it is also responsible for adopting "rules governing the location, construction and operation of uranium mills and uranium mill tailings disposal facilities and the treatment, storage and disposal of uranium mine overburden for the protection of the public health and safety and the environment."[288]

The Oregon statute gives specific guidance to the Council in developing these rules. The Council can issue no site certification for any disposal facility for uranium mine overburden, uranium mill tailings, mill waste, or mill by-product material unless its finds:

—that disposal plans are compatible with federal regulatory guidelines,

—that the site is suitable for disposal of such wastes,

—that no currently available alternative disposal sites exist,

—that disposal will be coordinated with regulatory programs of adjacent states,

—that following closure, radioactive releases will not exceed the statutory levels[289] unless the Council finds lower levels to be necessary,

—that suitable deed restrictions recognizing the hazard are placed on the site, and

—that a surety bond is provided to cover the costs of closing, monitoring, and maintaining post-closure security, and to ensure performance of site certification conditions.[290]

By imposing these conditions over and above the federal guidelines, Oregon assures that tailings will be safely disposed of during the current absence of federal regulations. In addition, coverage is extended to mine overburden, as well as mill tailings, management.

---

285. *Id.* § 70.121.050.
286. OR. REV. STAT. §§ 469.350-.420, 469.553-.559 (1983).
287. *Id.* § 469.559(1).
288. *Id.* § 469.556.
289. *Id.* § 469.300(17).
290. *Id.* § 469.375.

V. CONCLUSION

In 1985, the Virginia General Assembly will again face the question of whether to permit uranium development in the state. The Assembly can follow one of three courses. First, the Assembly can ban uranium mining and milling entirely. A second course of action is to extend the moratorium pending further study—the course that was taken by the Assembly in 1984.[291] The final option is to allow uranium development to proceed, subject to regulatory controls imposed by the Commonwealth and the federal government.

No state has enacted a permanent ban on uranium mining and milling. Three states, New York, New Jersey and Vermont, have, however, joined Virginia in imposing a temporary moratorium on development. The New York ban, enacted in 1983, says flatly that "the purpose of this article is to prohibit the mining of uranium within the state for a period of ten years."[292] The legislature found that uranium mining posed significant threats to water supply and water quality and endangered public health and livestock through release of airborne radionuclides, that no method existed for controlling mining hazards or wastes, that the state would be faced with significant cleanup costs if the mine were abandoned, and that mining could affect land values, the tourist industry, and the quality of life in the area.[293]

New Jersey's moratorium statute enacts a temporary ban until May, 1988, finding that "the hazards associated with . . . [mining and milling] activities cannot now be prevented or satisfactorily minimized."[294] The ban is clearly stated: "No person shall explore, beyond the reconnaissance phase, or extract, mill or process fissionable source materials [uranium] in this State."[295]

The Vermont moratorium is also a temporary ban, terminable by action of the General Assembly. The State Environmental Board is made responsible for licensing uranium mining applications, but before any application for a permit can be considered, the Environmental Board must "obtain the express approval of the general assembly by act of legislation stating that extraction or processing of fissionable source material will promote the general welfare."[296]

The mining and milling of uranium create serious, long-term hazards to public health and the natural environment. If Virginia decides to permit

---

291. *See supra* notes 13-14 and accompanying text.
292. N.Y. ENVTL. CONSERV. LAW § 22-1010 (McKinney Supp. 1983-84).
293. *Id.* § 22-1030.
294. N.J. STAT. ANN. § 13:1J-1 (1983-84).
295. *Id.* § 13:1J-3.
296. VT. STAT. ANN. tit. 10, § 6083 (Cum. Supp. 1983).

mining, some hard policy issues must be faced. The certainty of some environmental degradation and the long-term risk to Pittsylvania County residents of radiation exposure must be balanced against the economic benefits derived from the mining and milling operation. Uranium mining and milling cannot be conducted with absolute safety given current technology: the state must thus decide what level of risk is acceptable, and promulgate legislation to achieve that degree of protection.[297]

The states surveyed in this note enacted legislation on uranium mining and milling either in reaction to problems or in response to federal mandates. Virginia is in the unique position of being able to learn from the experience of these states, to fill in all of the gaps left in federal regulation, and to ensure environmental and public health protection *before* uranium extraction starts.

The system of federal regulation of uranium mining and milling is still far from complete. While the framework for environmental regulation of mining, milling, and mill tailings is in place, the regulations themselves are not. Where federal regulations do not yet exist, Virginia has the choice of leaving these areas unregulated, or moving ahead with site-specific regulatory controls that could later prove incompatible with the federal rules.

Under the UMTRCA and the Clean Air Act, the fate of the federal regulations proposed by the EPA is unknown. At the least, these regulations will be redrafted to reflect the current Administration's position on risk assessment and cost-effectiveness.[298] Both sets of regulations were drafted for western uranium operations, located in arid, sparsely-populated areas.[299] The controls proposed for these areas may be unsuited to an area with a higher population density, with more people at risk of exposure, and with a higher average rainfall.

Regulations under the Clean Water Act are in place, but cover only point-source pollution.[300] The major source of groundwater contamination—tailings pond seepage—will remain unregulated until EPA regulations under UMTRCA are in place. Controls on radioactive contamination from ore-stockpile or mine-overburden run-off do not exist. The injunction remedy under the Safe Drinking Water Act could be invoked once groundwater contamination occurred,[301] but would not prevent contamination until permanent damage had resulted.

State regulation will need to address these deficiencies, through both statutory criteria and substantive regulations. This division between stat-

297. *See supra* note 14 and accompanying text.
298. *See supra* notes 133 & 159 and accompanying text.
299. *See* 48 Fed. Reg. 15083 (1983).
300. *See supra* notes 165-81 and accompanying text.
301. *See supra* note 186 and accompanying text.

ute and regulation was recognized by the 1983 General Assembly:

> The former are of necessity the province of the legislature; but the latter should be (i) formulated subsequently, to implement the statutory criteria, (ii) by an administrative agency, (iii) after extensive fact finding, (iv) with opportunity for all public participation and (v) opportunity for judicial review of the final rules.[302]

The legislature, however, should not delegate policy decisions to administrative agencies. Statutory criteria should be carefully drawn, to give administrative agencies authority and clear direction for adoption of regulations, including the type and scope of regulations, opportunity for public participation, and sanctions for violations. The Oregon statute[303] is a good model for Virginia to follow, giving an administrative agency the responsibility for developing regulations and licensing operations within a fairly specific legislative framework.

Virginia has agencies in place which could assume the regulation of mining and milling: the Division of Mines, the State Air Pollution Control Board, the State Water Pollution Control Board, and the State Department of Health. These agencies, however, must be given specific legislative guidance for addressing the special problems associated with uranium. At a minimum, statutory criteria should include:

—stronger standards for exploratory drilling operations. Reclamation of affected land should be required, and monitoring of groundwater sources near drill sites should be instituted. In addition, the opportunity for public participation in the current permit procedure (which is rendered illusory by the statute's confidentiality provisions) should be strengthened. The General Assembly should consider a procedure like South Dakota's,[304] where permit applications are available for public inspection and comment.

—minimum groundwater protection standards for the SWCB No-Discharge Certification program. The General Assembly should direct the SWCB to consider seepage controls from tailings ponds, tailings disposal areas, ore stockpiles, and mine overburden storage areas. Groundwater quality should be monitored, and stringent penalties for contamination should be instituted.

—guidelines for the SAPCB to follow in the event that EPA's final NESHAP for radionuclides is not promulgated before mining commences. If the state fails to act in the absence of EPA regulations, the mine would

---

302. Freeman, *The Implications of the Consultants' Report of December 1982 for Immediate Decisionmaking—A Legal Perspective* 5 (Dec. 21, 1982) (preliminary discussion draft prepared for the Uranium Subcommittee of the Virginia Coal and Energy Commission by the law firm of Hunton & Williams).

303. *See supra* notes 286-90.

304. *See supra* note 215 and accompanying text.

fall under standards for an "existing" source, which are less stringent than those for new sources.[305]

—stronger statutory standards for surface mine reclamation. Provisions, perhaps like those of Oregon,[306] should be implemented to control erosion and seepage from mine overburden areas. Virginia should also develop stronger statutory guidelines for reclaiming mined areas, perhaps modeled after the Texas law[307] or the federal Surface Mining Control and Reclamation Act,[308] and should consider zoning restrictions on future use of the mine site.

Statutory criteria addressing mill tailings will be the most important consideration of the General Assembly, because of the long-term effects of poor tailings management. Under the federal Atomic Energy Act, as amended by the UMTRCA,[309] states can assume regulatory authority over uranium mill licensing, and promulgate regulations at least as stringent as those of the EPA and the NRC.[310] The five states discussed in detail in section IV have all taken on that responsibility.[311] If Virginia chooses *not* to assume this authority, the regulation and licensing of mill tailings will be conducted by the NRC, pursuant to the yet-uncertain regulations of the EPA.

Virginia's choice about assuming "agreement state" status, taking over the NRC's role, will not be a clear-cut decision. On the positive side, Virginia could develop site-specific regulations for the Pittsylvania mill, and could add additional protective measures to compensate for the fact that the EPA regulations are being developed to apply in areas with little rainfall. In addition, agreement status would allow adoption of provisions like those of Oregon, which would protect the state's public health and environment during the current absence of federal regulations.

Conversely, the development of state regulations would be costly, and would require a high level of technical expertise. The regulatory process itself would be politically controversial. Finally, there is less assurance that all relevent environmental factors would be considered in a state licensing decision, since the UMTRCA environmental impact statement requirements are less stringent for agreement states than for the NRC.[312]

Uranium mining is a hazardous industry—one which Virginia should allow only if adequate safeguards are built into the laws. The primary

---

305. State Air Pollution Control Board Reg. 1.02.
306. *See supra* notes 286-90 and accompanying text.
307. *See supra* note 260-64 and accompanying text.
308. *See supra* note 251.
309. *See supra* notes 78-137 and accompanying text.
310. *See supra* note 266 and accompanying text.
311. CONSULTANTS' REPORT, *supra* note 10, at 82.
312. *See supra* note 281.

consideration for the General Assembly should be to move into this area slowly and carefully, and assure *before* licensing that the maximum protection is being provided. Uranium mining and milling have unique and exceptional hazards, and should be stringently controlled.

Elizabeth V. Scott