UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of	)	
	)	
Philadelphia Electric Co. et. al.	)	Docket Nos. 50-277, 278
Peach Bottom Units 2 and 3	)	
	)	
Metropolitan Edison Co. et. al.	)	Docket No. 50-320
Three Mile Island Unit 2	)	
	)	
Public Service Electric & Gas Co.	)	Dockets Nos. 50-354 355
Hope Creek Units 1 and 2	)	

Reply to Staff Filing of July 3, 1980

We take issue with the staff's assertions that the Perkins record on radon releases from mining and milling uranium remains valid. Further, we object strongly to the staff's attempt to circumvent even the modicum of due process that intervenors have received in this proceeding by eliminating the issues of health effects and the de minimus theory from further consideration.

Uranium Mining

The staff's claim that its estimate that 270 Ci per year per RRY will be released from unsealed unde ground mines is "conservatively high" (Staff filing, p. 16) is based on extremely shaky foundations. The staff used a Battelle study of radon emissions from active underground mines to make its estimate, and then claims to introduce conservatism because it is "unlikely" that the same magnitude of emissions will come from an inactive mine with o forced ventilation (Ibid. p. 15). The Battelle figures are reputedly reliable—even though the staff's estimate of the annual release from an active mine rose from 4,060 Ci/RRY to 8,000 Ci/RRY between the Perkins hearing and last February. The supposed reason for the reliability is that now we are living with a "mature" mine population (Ibid. p. 14). The record flatly contradicts all these assertions.

Far from testifying that it was "unlikely" that inactive mines would emit as much radon as active ones, the staff witness, Wilde, admitted that because of the half-life of radon (3.8 days), it was quite possible that releases from inactive mines would be

of the same magnitude as those from active mines, and further, that his previous declaration that the possibility was "inconceivable" was "a poor choice of words." (TR 422).

Wilde's faith that we now have a "mature" mine population was based on data for years of production from 23 mines, with nothing more rigorous in the way of statistics than taking the average age of the mines (TR 413). In light of the drastic changes in the staff's estimates of radon emissions per RRY, more than that statistic is required to convince us that the number will not change drastically in the future.

In addition, there is testimony indicating that the mines Battelle surveyed were not evenly distributed as far as cumulative ore production is concerned — and both the witness and the Battelle report say that cumulative ore production is most highly correlated to radon emissions. Wilde testified that there were more mines in the Battelle data base in the lower ranges of cumulative ore production than in the higher ranges (TR 392-393). Since the mines with higher production would be expected to release more radon per ton of ore, the Battelle data is an underestimate of what would occur in a truly "mature" mine society — if indeed such a thing even exists.

To arrive at its estimate of 270 Ci/yr/RRY the staff assumed that the average mine produced ore for 30 years. A previous Battelle report, however, had assumed the mine lifetime was 20 years (TR 403). The staff adopted the second Battelle figure of 30 years with no questions asked (TR 404), and there appears no basis whatsoever for it.

How reliable is the estimate of 270 Ci/yr/RRY? When the witness was asked, he replied: "I feel that that figure is as reliable as the reliability of the Battelle measurements of radon releases, and as reliable as the assumptions I have made in my calculations." (TR 396). This does not indicate overwhelming confidence. It is a cautious statement, which is understandable in view of the evidence.

The evidence shows that there is little relation between ore production and radon releases. There is slightly more connection between cumulative ore production and radon releases, but even this agreement is not very good (TR 411). The actual figures

from mines indicate releases of up to 55,000 Ci/RRY, even more if the staff's assumptions on uranium required per RRY are used instead of Battelle's (TR 393-394). To compound the unreliability of the estimate, the staff did not even attempt to find the correlation between cumulative ore production and radon releases, but instead used the ore production figures from one year—1978—to arrive at its so called reliable and "conservative" estimate (TR 395).

In light of the foregoing, we cannot conceive how the staff can expect anyone to believe its claim that the estimate of radon releases from abandoned, unsealed underground mines is conservative or even reasonable.

The staff takes Dr. Pohl to task for daring to assume a different tailings pile thickness than did the staff (Staff filing, p. 32). Dr. Pohl's assumption of a 6-meter thickness was the same used in the GEIS, and it is obviously more conservative than the staff's assumption. What is the objection to conservatism? The staff says Dr. Pohl "conceded" that tailings pile thickness can vary (Ibid.). That is precisely the point; it is not at all a concession. Tailings pile thickness can vary, so, if the staff really wishes to be conservative, it must be willing to look at the thin as well as the thick.

The staff argues that Dr. Pohl's postulation of a completely eroded tailings pile is possible, but "non-realistic." (Ibid. p. 37). However, the staff refuses to consider any erosion of the pile at all. This is certainly non-realistic. Dr. Pohl's example was intended as a worst case. The staff feels that not only should we ignore the worst case, but anything even approaching it. It is patently ridiculous to assert that the worst thing that can happen to a tailings pile for the next 80,000 years is for it to lose its cover, and that, after losing the cover, it is "non-realistic" to suspect that the tailings themselves could erode.

The staff's claim that water pathways for radioactive contamination from tailings piles are negligible (Ibid. p. 46) is written in language that reveals the staff's own

doubts. The staff says "steps are being taken to reduce or eliminate seepage from tailings." (our emphasis). The statement continues:

"Tailings are in most cases being isolated from aquifers. Some seepage will occur but the nuclides involved tend to sorb or ion exchange and not migrate to any appreciable extent ." (Ibid. p. 46, our emphasis). These cautious modifiers eliminate any confidence in the statements.

The staff cited TR 505-507 to back up its statement that water pathways might be more significant in natural ore bodies than from tailings because of "mill licensing requirements to isolate tailings contaminants." (Ibid. p. 47). However, the transcript that is cited does not mention the so-called "requirements," but merely states that because uranium ore is often located below groundwater tables, the nuclides in the ore "should not pose any substantially greater hazard after (milling) than they did before the ore was mined, except perhaps in the immediate vicinity of the pit...." (TR 506-507). But this statement is contradicted by the witness under cross examination, as illustrated in the following exchange:

"A. Yes. I would expect that if the tailings were placed below groundwater that the concentration in the groundwater in the previously mined out area into which the tailings were placed would probably be higher than it was when the ore was there before being mined...But that this would be local in the sense of being confined to the immediate area of the pit and its surroundings. A matter of some feet.

"Q. Are you suggesting then that for naturally dissolved radium that the, shall we say, mean-free path of radium dissolved in water is on the order of a few feet?

"A. No. That, again, depends on the specific nature and the properties of the soils and rock in the area." (TR 513).

Again, the witness testifies that site specific factors will determine the distance contaminants will travel in water: "I would expect the radium to move not very far from this pit we're talking about. How far it might move is (a) function of the characteristics of the aquifer, the soils, the rocks through which it's moving." (TR 51

These statements are inconsistent with the generalization cited by staff at TR 505-507.

Finally, the witness testifies that the fact that tailings piles have more surface area than the ore from which they were produced "would play a major, if not the major, role in the ability of materials located thereon to be dissolved and transported." (TR 518). Since the mining and milling of uranium obviously increases the surface area, this statement goes contrary to the witness's earlier claim that there is not a "substantially greater hazard" of water transport from tailings than from natural ore.

We fail to find any basis for the staff's assertion that the effect of water transport would be offset by a reduction in radon emissions to the air (Staff filing, p. 47). The staff citation is to "Ibid." but there is no mention of this subject in the previous citation, TR 505-507.

In general, the staff's statements on emissions from milll tailings are a blatant attempt to convince the Board that the staff's predictions of stability for "many thousands of years" (How many we still aren't told) will come true because the staff says they will. The staff completely ignores the possibility of human intrusion into abandoned tailings, a scenario that is much more realistic than the staff's presumptions of forever intact tailings piles free of any need for "active maintenance."

In the real world, people built houses on tailings, as we have seen from the Grand Junction disaster. Now we learn, through a report in the New York Times Magazine (July 13, 1980) that in Edgmont, S.D., the tailings piles were used for recreation as well; children played in the sandy piles and swam in the tailings ponds. Sometime during the past several months, the Times reporter and several other persons easily trespassed into the tailings pile area, despite a fence (no need for active maintenance), the Uranium Mill Tailings Radiation Control Act of 1978, and the staff's interim guidelines. We ask the Board to take official notice of the July 13 New York Times article.

The staff's reassuring statements about guidelines, engineering solutions and quality assurance cannot disguise the fact that the proposed method for disposing of

this hazardous and almost permanently toxic material is to pile it up on the ground or in shallow pits. Somehow the staff expects the tailings to stay piled up and untouched by humans for at least 80,000 years. Unfortunately, the staff will not suffer the consequences if its confidence turns out to be wrong.

Health Effects and De Minimus

The staff asks the Board to adopt the Perkins decision without further hearings on health effects or the de minimus theory. We remind the Board and staff that using the Perkins record and decision as a "lead case" for the licensing cases under appeal after radon became a generic issue in 1978 was a convenience for the Board, but it cannot be used to deprive intervenors of their rights to litigate the radon matter. We have objected to portions of the Perkins record and decision in the areas of health effects and the de minimus theory and we have asked to augment the record on these issues. We cannot see how many finding made by the Board on radon source terms — the subject of the February evidentiary hearing — could be the basis for cutting off discussion of health effects and de minimus.

Deficiency No. 1

The staff's arguments in favor of upholding the Board's previous decision on Deficiency No. 1 are misleading and sometimes incomprehensible. For instance, the staff claims that its correlation of mine production to radon emissions is "perfect" because the staff knows how to divide one number into another. (Staff filing, p. 25). The question is, has the staff come up with an accurate estimate of the radon that will be released from mines for each year's requirement of uranium fuel for a reactor? The staff claims not even to be asking this question (Ibid.) But what else can staff witnesses mean when they testify that a certain number of curies will be emitted "per RRY," except a prediction based on a relationship between "an amount of production and radon releases" ?

The staff's statement on page 23 of its filing that the amount of radon per RRY has risen only from 4,060 to 5,200 curies between Perkins and now is so misleading that we wonder if the obfuscation is deliberate. The fact that the difference between

these numbers is relatively small (although it is still an increase of more than 25 per cent) is due to several significant changes in the components of the numbers: namely, the estimated releases from open pit mines declined and those from underground mines increased. The staff is trying to cover up these substantial changes by averaging open pit and underground mines together. More important, this comparison is completely irrelevant to a discussion of whether there is any correlation between production and radon releases—the subject of the deficiency.

That there is very poor correlation, if any, between these two parameters was made obvious during the February hearing. Thus the staff's claim that the information presented at the hearing is "irrelevant to the fundamental assertion" in Deficiency No. 1 is plainly wrong.

Conclusion

The Board should adopt the findings of the intervenors on the radon source terms from mining and milling uranium, and on Deficiency No. 1, and should reject the staff's request for a decision on health effects and de minimus. Ecology Action also adopts the reply filed by Citizens for a Safe Environment and would like the Board to consider that reply as filed on our behalf also.

Ruth Caplan

Ruth Caplan
for Ecology Action of Oswego

July 16, 1980

HIGH NOON IN THE BLACK HILLS

By Peter Matthiessen

The fate of five men who ventured into South Dakota's Black Hills — the sacred Paha Sapa of the Lakota Sioux — was scrawled in Ezra Kind's last note: "All kilt but me." That small expedition in 1835 was probably the first to discover "gold in them thar hills." Although gold was certainly located by several parties that came after, it was the announced "discovery" by Gen. George Custer's military expedition in 1874 that set off a rush to the Black Hills. The Indians called the expedition route "Thieves' Road" because Custer had invaded the land in what they saw as a flagrant violation of the Fort Laramie Treaty of 1868; the general's death, at the hands of the Lakota and Cheyenne in 1876, provided his Government with the excuse to "abrogate" the treaty — an act that the United States Court of Claims last year called "the most rank and ripe case of dishonorable dealing in our history." With that, the gold rush was on. By 1877, George Hearst's Homestake Mine had begun operations in the northern hills. Ten years later, it was worth $6 million, and since then several billions more in mined minerals have been removed from the Black Hills.

Today the Black Hills are being invaded again, not for gold but for uranium. And this time, not only the Indians but many of the white people are protesting, some of them cattle ranchers and farmers descended from the original homesteaders. They fear for their health and the health of their children, as well as their lands and water supplies. They insist they are threatened by exposure to the radiation given off in mining and milling uranium for nuclear energy. But the miners, the in-

Peter Matthiessen, 1979 winner of the National Book Award for "The Snow Leopard," is at work on a book about Indians and their lands.

dustry people, many residents and local politicians insist that no harm will be done to life or to the environment; that, on the contrary, a booming uranium industry will add to the well-being of an area that is badly in need of jobs and industrial production.

What South Dakota decides to do affects not only its Indians and ranchers and unemployed workers, but the whole national problem of uranium mining. Millions upon millions of tons of radioactive tailings, the residue from uranium-extracted ore, are piling up around the country, and the costs of disposing of them safely have defied any accurate calculation. Nevertheless, the industry insists that the operations can be made safe, and the Nuclear Regulatory Commission says that the nation requires 13,000 tons of uranium a year for its present power plants, not to mention export needs.

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Uranium was found in South Dakota in 1951 and two years later the Atomic Energy Commission began the reconnaissance that turned up uranium at the north as well as the south end of the Black Hills. Because the A.E.C. and the military were the only buyers, uranium mining proved unprofitable and, eventually, many of the mines and processing mills were shut down. But with the development of domestic nuclear power in the late 1960's, the uranium rush began in earnest. Since the Lakota Sioux have been pressing their land claims, based on the treaty of 1868, for legal recognition of their right to the Paha Sapa, the energy companies moved quietly in securing leases. (The Supreme Court's recent decision, awarding $122.5 million to the Lakota Sioux in compensation for the Government's illegal seizure of the Black Hills in 1877, is viewed as unacceptable by the traditional Lakota, because the land is sacred to them and they do not acknowledge that it can be yielded up for money; in addition, acceptance of this award would require them to waive any claims on Paha Sapa they might make in the future.)

Large-scale exploration commenced in the early 1970's, and today state uranium-mining permits have been issued for more than three million acres, with more than a million acres already staked or leased for general mineral mining by about 25 corporations. Of those 25, two are close to beginning actual uranium mining and milling operations: Union Carbide Corporation and the Federally owned Tennessee Valley Authority, both of which have extensive leases in the southern hills.

The town of Edgemont, S.D., 13 miles east of the Wyoming border, is the site of the state's first uranium discovery as well as the site of an old uranium mill left behind by Susquehanna-Western, which sold its property and leases to T.V.A. in 1974. In and around Edgemont, like monuments to the current controversy, are large piles of radioactive uranium tailings, the sandlike material that remains after the milling process. Below the piles — 3.9 million tons of them — are an estimated 3.6 million tons of contaminated earth. The Edgemont tailings, which border residential sections, are also close to the Cheyenne River, a main source for local wells for miles downstream; in 1962, an estimated 200 tons of tailings were spilled into the river, washing eastward at least 25 miles to the Angostura Reservoir. Federal studies suggest that uncovered uranium tailings, which contain various forms of radioactive material, including radon and its derivatives, are highly dangerous. "Uranium mill tailings pose the largest hazard among existing nuclear fuel cycles," says Dr. John Deutch, former Under Secretary of the Department of Energy, who headed a study of all 22 of the inactive uranium sites at eight Western states.

T.V.A. says that, as a temporary measure, it has voluntarily covered all the tailings. It estimates that the cost of permanently disposing of them would be $30 million. Environmentalists question whether the tailings are now properly covered, and whether more than 7.5 million tons of contaminated matter can be dug out and hauled away — to where? — without spilling harmful amounts of radioactive dust in the process.

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The first stage of the mining process — the drilling of exploratory bore holes — is also a matter for bitter argument. To date, T.V.A. has drilled 6,000 exploration holes in search of fuel for the seven nuclear power plants it proposes to build in the East. Under the new state regulations, all test borings must be plugged and capped; when they cut across aquifers — water-bearing beds of earth, gravel or porous stone — they must be sealed off from the aquifers with cement. The companies say they are doing this, and will continue to do so, but critics point out that a mere 1 percent error in covering the borings would leave 60 well holes in which radioactivity from a strata of uranium ore could leach into the water system.

To facilitate the sinking of one mine shaft, T.V.A. plans to pump water out of the ground at the rate of 675 gallons per minute (similar dewatering operations in New Mexico are now using increasingly scarce water at an estimated rate of 100,000 gallons per minute). T.V.A.'s environmental-impact statement for its Edgemont project acknowledges that "dewatering operations will cause a depression of ground-water levels in the Lakota Formation which will result in some wells to cease flowing." The lakes and streams of the Black Hills and the tilted rock layers, which insure that much of the rainfall restores groundwater to the great aquifers, have provided abundant water for the agriculture and tourism on which, until recently, the state's economy has been based. Now the energy industry covets this water, which is required in immense amounts for all phases of its operations. Already, energy production has lowered the water table considerably in parts of Wyoming and South Dakota, and artesian wells in the southern Black Hills have started to go dry.

Union Carbide Corporation, which shares the proposed development of the Edgemont region with T.V.A., has drilled thousands of bore holes, including a horizontal tunnel 2,000 feet long on Federal land in Craven Canyon, where it had hoped to begin mining late this year. The company proposes to dump huge heaps of ore from its 10 projected mines at Robinson Flats, 12 miles from Edgemont. Sulfuric acid would be poured into the heaps and would seep down to a clay base to leach out the uranium, which would then be drained off in liquid form. Company spokesmen say the clay base will prevent the remaining tailings (which retain an estimated 85 percent of the original radioactivity) from leaking into the water table. "Nothing is 100 percent," says Union Carbide's Dudley Blancke, "but I am absolutely convinced that we can come up with a plan for future mining that will in no way harm the health of the people of this state." The opponents of mining contend that no one can be sure that this clay base will permanently stop the spread of radioactivity, and since contamination of the ground water, once started, is very hard to stop, those South Dakotans whose wells run dry may be better off in the long run than their neighbors.

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The present battle in the town of Edgemont began unnoticed in 1961, when a local contractor used three loads of tailings as fill for the foundation of a house. Ten years later, an Environmental Protection Agency monitoring team received high radiation readings from this site and 44 others in Edgemont. But somehow the results of this survey "must have fallen through the cracks," according to John Giedt in E.P.A.'s Denver office. "We made it available to the A.E.C. and they chose to do nothing about it." Subsequently, the A.E.C. (now the Nuclear Regulatory Commission) ruled that the old mill, which had closed down in 1972, could not be reopened, and ordered that the mill and tailings piles be properly cleaned up. But there was no public announcement about the 45 high radiation readings, which represented what the E.P.A.'s Paul Smith now calls a "radiation legacy perpetrated on the community."

Who did anyone speak up five years later when the house built on tailings was sold to a young railroad worker named Neal Brafford, who happens to be part Lakota Indian. In 1978, a second E.P.A. survey that located 60 additional "hot spots," including an Edgemont schoolyard, recorded that the Brafford house had the highest reading in the highly radioactive town. According to Smith, a copy of this report was made available to Edgemont's Mayor Peter Zeimet, a former mill superintendent. Zeimet acknowledges that fact but adds that he saw no reason to alarm people: "We had no local indications of any radon problems." He says the lung cancer rate in the Edgemont area is no higher than the national average, and he agrees with industry spokesmen who contend that compliance with new Nuclear Regulatory Commission rules will correct possibly dangerous practices of the past and prevent them in the future. However, monitoring the industry to make certain that it is complying with regulations has proved difficult. As recently as two years ago, one Federal mine inspector estimated that, based on spot checks, the nation's uranium miners were being exposed to radiation levels that were roughly five times higher than the levels reported by the companies. Joseph Wagoner, a research epidemiologist with the U.S. Public Health Service, whose studies show that workers quadruple their

A new rush is on in the Black Hills — this time for uranium. But whites have joined with Indians to protest the mines which, they say, threaten their health, water and lands with radiation.

Decrying the health threat posed by uranium mining in South Dakota, 3,500 people participated in a 17-mile protest march through the Black Hills on July 8, 1979.

chances of getting lung cancer by working in underground uranium mines, also found that it took from 15 to 20 years for the disease to become apparent.

Last year, monitors were installed in the Brafford house and, within a few days, the South Dakota Department of Water and Natural Resources warned the family that 5-year-old Chris Brafford should be removed from his basement room, where he had lived for two and a half years. Radiation levels throughout the house were more than four times the maximum exposure allowed for uranium miners (who are only exposed for eight hours each day) and nearly 40 times E.P.A.'s proposed standard for houses. In the sickening knowledge that he and his wife, Genny, and their three small children must live for the rest of their lives with the dread of cancer, Brafford removed the whole family from the house to a new apartment paid for by T.V.A. But when Neil Brafford tried to share what he had learned with his fellow citizens, he found himself dismissed as a troublemaking "longhair," as traditional Indians are known in South Dakota.

Confronted by a hostile town, and having decided that the corporations and the state were determined to dodge responsibility for what had happened, Brafford telephoned the staff attorneys of the Black Hills Alliance, a burgeoning environmental group, composed of Indians as well as whites, that was founded in January 1979, the same month that Gov. William Janklow abolished his Department of Environmental Protection. Funded almost entirely by voluntary contributions and manned by a volunteer staff of researchers and lawyers, the alliance was seeking to educate South Dakotans about the long-term consequences of uranium mining, and was taking corporations into court for alleged transgressions of environmental laws, which the state itself shows little interest in enforcing.

The alliance hopes that the huge 10-day "survival gathering" on alternate energy sources, to be held in the Black Hills July 18-27, will attract support in November for a uranium referendum — sponsored by an allied group, the Black Hills Energy Coalition — which would outlaw nuclear power plants and waste dumps in the state, and give the public a "freedom of choice" vote on uranium mining permits every two years. Meanwhile, the alliance is vigorously backing the Lakota land claim based on the Fort Laramie Treaty — a claim which the Supreme Court has recognized but which it has decided should be settled by payment of money to the Lakota. This claim would call all Black Hills land titles into question, and bury the mining leases in the courts almost indefinitely.

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Edgemont is set among sad cottonwoods and railroad spurs that fringe the dead mill and a huge tailings pile on the south side of the Cheyenne River. Apart from a big new access road, the uranium boom is not yet evident.

"Edgemont is a very tense little town," according to one B.H.A. volunteer. "They want the boom back at any cost, but they don't want to hear what that cost is going to be. One day, I was in a cafe down there and the number of fights and arguments in there, I mean one after another, was just amazing; I couldn't believe it! I got the feeling that if we had said anything at all about the mining, we might have gotten ourselves lynched."

Neil Brafford, whose mother is Lakota, is a tall young man with a mustache and sideburns and his hair is worn long down his back; because he has been laid off from his job with Burlington Northern, he passes time watching television in his basement apartment. Brafford worked in the uranium mill before getting his job with the railroad, and he is still shaking his head over what has happened. "Those guys in the mill were so brainwashed they were telling each other they were getting less radiation from uranium than they were from their color TV's." One of Neil's friends in the mill now has cancer of the thyroid, and a number of his Edgemont neighbors have at least one cancer victim in the family. After the report about his house became public knowledge, Brafford says, "I figured people would come to see us, find out what we'd learned, but they never did. And now they say we're just trying to get publicity for ourselves."

"Publicity!" Genny Brafford exclaims, overhearing him as she comes into the room. "This town really makes me laugh. Nobody's got enough courage to pull out, pull up stakes, begin again somewhere else, so they try to blame us, blame the alliance for stirring up the Indians!"

"The whole town is sore at the 'troublemaking longhairs,'" says Neil's younger sister, Susie. "'You're tearing down the name of this place, just when there's a boom coming!' But nobody wants to help out Neil and Genny."

"When I first heard that report about Chris's bedroom," Genny Brafford said, "I just wanted to punch somebody in the nose." She picks up her 3-year-old, Marisa, a beautiful child who had wandered out of her bedroom, still half-asleep; Marisa had spent most of her young life in the plagued house — the most vulnerable period because of the swift growth of infant cells. "They all say there's nothing wrong, but I don't see anybody stepping up to buy our home."

Because Chris Brafford is still asleep, his mother does not accompany us on an expedition down the hill to their former home. The small, red-roofed dwelling, shaded by cottonwoods, has a long yard that slopes downhill from the tailings fill that permitted the house to be built on level ground; the tailings were removed by the contractor without permission, Susquehanna-Western says, declining all responsibility. Because the family vacated so suddenly last January, "Merry Christmas" is still framed on the window, and on the floor of Chris's room in the basement of the dank, still house, lies a Polaroid photograph taken of the little boy last Halloween. "Where you're standing," Neil Brafford is saying, "the monitor got the highest reading of all." Handed the photograph of Chris, swollen-headed, in an orange-bearded Halloween fright mask, he winces, then manages a wry, unhappy smile. "You see?" he says, "That's what started to happen to him down here." Everyone laughs, very anxious to get into fresh air. "I guess maybe the Great Spirit doesn't want that stuff coming up out of the ground," says Vivian Haskell, a young Lakota volunteer. "I signed up with the alliance because I feel these companies are doing something against me — me and my two kids."

Closing the front door of the house, Neil Brafford gazes at his big yard and garden; in the distress of a few months before, he had not bothered to retrieve his hose and shovel. "This house was the first big thing I ever bought in my whole life," he says, "and I had to give it up. We were here only two and a half years, and that was exactly two and a half years too long. Last year I grew two-foot string beans, and cucumbers all swollen up the size of melons, and the baby, he's just 8 months old,

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dian and white volunteers of the antimining Black Hills Alliance.

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and he's wearing 2-year-old clothes; nobody could believe it. But maybe we'd better not let that out; they'll be telling us next that nuclear is good for us!" Neil Brafford laughs — the first time, says volunteer Colleen Ragan, since she's known him.

Crossing the railroad yards to the community called Cottonwood, we look at the tailings pile and the abandoned mill. The area is now surrounded by a new chain-link fence bearing signs reading CAUTION: RADIOACTIVE MATERIALS, and NO TRESPASSING. "Used to be just that little cattle fence you see inside there," Neil Brafford says. Noticing that even the new fence is not childproof, we all trespass easily past the chain on the new gate and walk down to Cottonwood Creek, crossing its strange red water on a plank in order to climb the tailings pile on the far side. For many years, according to the Braffords, the pile was simply a huge dune of "sand" where all the Edgemont schoolchildren came to play; a much larger pile is visible, just downriver.

"When we were growing up here," Susie Brafford says, "we'd come on over after school and roll around in the piles, roll right down into that creek there — *splash!* — and swim in the little tailings pond, and nobody ever came out from the mill to run us off. One day, one girl went all the way under, got some in her eyes and ran home crying. We used to bury kids up to their necks in this damned stuff — just let 'em sit there!" Susie Brafford laughs, a little startled, but the laugh is bitter. "I remember once I had a bad cut on my leg when I was swimming here." She shrugs, glancing at her brother. "We have a history of cancer in our family, too." Neil looks somber. "I don't know yet what I'm going to do or where I'm going," he sighs. "All I know is, it won't be anywhere near uranium mining. Edgemont was the town where I wanted to live, but not anymore."

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Edgemont residents who favor the mining tend to dismiss the fears of health danger from radiation. "It's a bunch of hooey," says Eugenia Chord, who with her husband staked a uranium claim in nearby Red Canyon nearly 30 years ago and guarded it with their lives. "There's been no epidemic of cancer in Edgemont. Why, it's just like finding gold. It's money in your pocket." She keeps a piece of uranium tucked in a dresser drawer "where it's safe." And Mayor Zeimet says, "The Black Hills Alliance — they make statements they never prove. . . . The radon problem is like autos; they run up and down the street all the time but there's no high concentration [of toxic fumes]." Keith Anderson, City Council president, adds, "Frankly, the negative, one-sided approach of the . . . Black Hills Alliance leaves me cold. Many of us in Edgemont endorse the development of mining and milling in our community. Before we are labeled as a selfish, greedy mob, stop to consider why we support this development. The economic benefits are obvious, but no one believes they are worth destroying our environment. . . . We believe we can work with the companies and state and Federal agencies to develop adequate safeguards

to protect our water, air and quality of life."

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Marvin Kammerer is a wry, wiry rancher in jeans and boots whose grandfather came to the Black Hills in 1880, working on a freight train hauling the wire that was already fencing off the range; his youngest children still ride horses to the little school built by his grandfather in 1889. "What my grandfather told my father was: 'Don't sell the land.' I feel the same way the Indians do; I don't own that land, it owns me, because my father and grandfather are buried there."

Marvin Kammerer was one of the first ranchers to endorse the Black Hills Alliance. Asked what he thought about the Lakota land claim, he raised his eyebrows, paused a moment, then said flatly, "I've read the Fort Laramie Treaty, and it seems pretty simple to me; their claim is justified. There's no way the Indians are going to get all of that land back, but the state land and the Federal land should be returned to them. Out of respect for those people, and for their belief that the hills are sacred ground, I don't want to be a part of this destruction."

When I asked Kammerer if he saw any way in which uranium mining in South Dakota would be acceptable, he raised his voice: "There's *no* way it's acceptable! Certainly not for weapons — that's just insane! And as for energy, we already have an excess. And what do we do with all that waste? That's why I'm against *all* nuclear mining; these corporations aren't accepting responsibility for what they are doing, for all that destructive potential that innocent people have to live with."

Marvin Kammerer shook his head, disgusted; for a moment I thought he might spit on the floor. "We're so damned *wasteful!* And wasting resources is like stealing from the children to come. The worst waste of all around here now is water. The pollution of ground water is very serious, but in the long run, the plain shortage of it is going to be more serious yet; without irrigation, there won't be any agriculture."

At present, the energy industry is considering plans to encircle the Black Hills with 13 coal-fired plants, producing 10,000 megawatts apiece; more than 60 additional plants

are under consideration. There is also a proposed nuclear-energy "park" of as many as 25 reactors, with attendant waste-reprocessing and disposal grounds, fed by thousands of exploration holes, mines, mills and tailings piles, all of them managed by far-away companies.

Like Marvin Kammerer, the Indian leader Ted Means is increasingly concerned about the water. "They want it all for energy development," he told me during a talk at Pine Ridge, where the Indians believe that their wells are now contaminated, "and they don't want to hear about pollution. But people are coming to us, tears in their eyes, with deformed babies, babies with holes in their hearts, asking us what to do; this is starting to happen more and more. For 30 years of energy, the Government is willing to sacrifice everyone here, not just Indians anymore but everybody."

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There are signs that the Black Hills Alliance's "delaying actions" are having an effect, at least in the southern hills. Union Carbide has slowed its operations, pending November's uranium referendum. Union Carbide has been "effectively stopped in its tracks," concedes the Edgemont city planner John Krueger; and T.V.A.'s Clinton Smythe says that much of its proposed operation has to be replanned and resubmitted for approval by Federal and state agencies. Many of the alliance members are confident that they will win the long-range war as well as the short-term battles. The reason for their feeling may have something to do with the depth of their commitment. "The spirit is fantastic around here," says Madonna Thunder Hawk, a B.H.A. volunteer. "I come into the office, you know, and just feel good. It's not just what B.H.A. is accomplishing; I'm thankful that I've found a way to fight the whole damned syndrome of Indian existence."

Juanita Pullins, a young white woman raised at Sturgis, in the northern hills, says that her work for the alliance has brought about "a real education" of her family, which once shared the strong race prejudices in this region.

Winona LaDuke, a charismatic young Ojibwa, one of the alliance's most effective public speakers, writers and organizers, who also works in the Southwest, says, "The Black Hills are an oasis in the Great Plains, a source of water and life to the whole region. And they are a spiritual center for the Lakota Nation; for as long as the old people can remember, there have been prayers and songs to 'Paha Sapa, our life blood.' Farmers and ranchers as well as Indians, all people who live with the earth instead of exploiting her, can also understand the sacredness of the Black Hills. For such people, the Black Hills is not just another mine site with a 'potential' for energy production. Paha Sapa is the great battlefield in the energy wars against the Indians — and the new Indians are white as well as red."

A young B.H.A. lawyer named Bruce Ellison agrees. "There's a force working to save the Black Hills," he says, "that's surmounting barriers everyone said were insurmountable, between people, red as well as white, who were pretty damned set in their ways. They've gotten beyond pointing fingers at each other, and they're looking hard at the real enemy of both. The argument down there at Edgemont is life versus economics. Look at the uranium problems in New Mexico! The Navajo miners were starting to die down there before it was realized that the real problem had nothing to do with people's color. Here in South Dakota, we can't win five years from now, 10 years from now — that's already too late. We have to stop this thing *this* year, and we're going to do it." He grinned. "We have to win. We have no choice and so we will." ■