

ATOMIC
POWER
ABUSE:

The AEC in Colorado



'WELL . . . PERHAPS WE WERE A LITTLE WRONG—

by Anthony Ripley

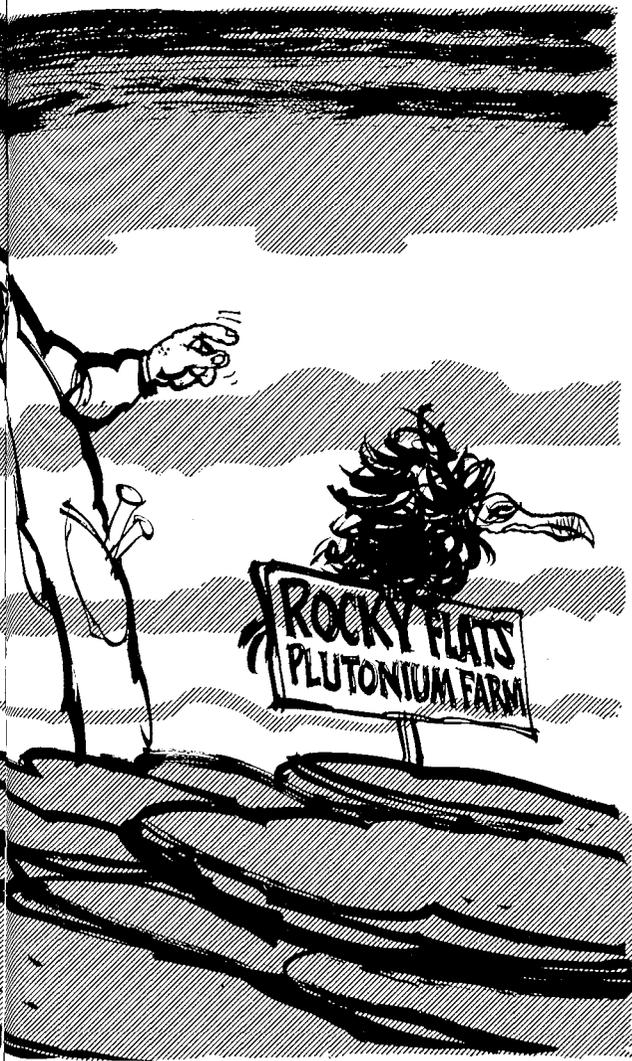
They were stinging words that Colorado's Lieutenant Governor Mark Hogan aimed at the mighty and once-sacred Atomic Energy Commission. "The AEC has gone too far," Hogan said. "It's back is going to have to be broken." The agency's officials, he charged, "if they are not telling falsehoods, are talking in ways that are meant to deceive."

Such harshness is expected from political mavericks or sandwich-board fanatics. Mark Hogan is neither. He is a blue-eyed, handsome, organization Democrat—a careful, studied, ambitious politician. But Hogan's attack on the AEC is a measure of the rapidly rising doubt felt in Colorado about the benefits of the atom and about the operations of the federal agency whose power and expertise in this arcane field have in the past gone virtually unchallenged, and whose insistent claims about its own safety precautions have been generally accepted. The doubt and concern are intense enough, in fact, so that Hogan, running for governor this fall against popular incumbent Republican John A. Love, has felt secure in making atomic energy an issue in his campaign.

Agitation over the workings of the AEC is not confined to Colorado. Groups in other states across the country have been raising questions and voicing qualms about the agency, which was established in 1946 to bring atomic power under civilian control. Elsewhere, though, the major focus has been on the safety and environmental hazards posed by nuclear-powered generating plants. But the people of Colorado have a greater variety of nuclear worries.

Hogan's attack, for instance, was prompted by the publication of a report,

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-BUT NOT SERIOUSLY WRONG!

drawn up by non-agency scientists, which revealed that the AEC's Rocky Flats plant, located on a high, windswept rise between Denver and Boulder, had leaked highly toxic plutonium oxide into the surrounding countryside. The fire-prone plant, which makes plutonium triggers for hydrogen bombs, is operated by Dow Chemical Company. Its plutonium oxide leak came on May 11, 1969, during one of the most costly industrial fires in the nation's history. The AEC and Dow at first denied there was any release of radioactivity but later were forced to admit it.

Also troubling people in Colorado are the effects of Project Rulison, an underground nuclear explosion set off last September under the western slope of the Rocky Mountains, near Grand Junction. Rulison was to be the first of several hundred underground shots in the same area aimed at freeing deposits of natural gas by cracking rock deep beneath the surface. The initial explosion cracked things above ground, too. By the beginning of May, over \$76,000 had been paid in property damage claims from the tremors of the blast. The gas produced, tainted by radioactivity, will be burned off, releasing some radioactivity to the atmosphere. The exact amount involved and its danger is a matter of controversy.

In Grand Junction itself, the Colorado Department of Health is installing new radiation sampling equipment in private homes, offices, and businesses. Its purpose is to monitor radioactivity given off by the gray, sand-like wastes from uranium milling which builders, until the practice was stopped in 1966, used as fill under concrete slabs and basements. These wastes, called tailings, produce a radioactive gas that seeps through concrete. Radioactivity levels in some houses, with 24-hour-a-day exposure, are well beyond what is permitted for miners on an eight-hour shift in a uranium mine. Other tailings have washed into rivers, bringing radioactive pollution downstream. In all, there are about 15 million tons of such tailings

piled around the area of the Colorado River basin.

Another radiation problem, the state's oldest, is the high death rate among uranium miners on the Colorado Plateau. Of 6,000 men who have mined uranium, health officials predict 600 to 1,100 will die of lung cancer by 1985. It is a tragic replay of the lung cancer deaths in Europe among miners who dug radioactive ores for Pierre and Marie Curie.

If the range of nuclear-related problems in Colorado is broader, however, the concern wider spread, and the furor correspondingly more vigorous than elsewhere in the country, the behavior of the AEC in all of this has been different merely in degree, not in kind, from what it has been in other states. The evasiveness, the absence of genuine consultation, the reluctance to accept responsibility, and, above all, the mistakes in judgment demonstrated by the agency may have been exacerbated by the scope of its activities, but with the constantly expanding use of atomic power, there is every indication that what has been happening in Colorado is a portent, not an aberration. The implications for the rest of the country are only too clear.

Some of the protest against the AEC in Colorado grew from the work of the Colorado Committee for Environmental Information, one of a number of non-profit information groups run by scientists across the nation. Dr. H. Peter Metzger, a Boulder biochemist, is president of the Committee. He believes the AEC record in the state has been "tragic." There is no way to argue or explain away, he says, the deaths of the miners, the plutonium leak, the property damage from Rulison, or radiation from the tailings piles. But the agency's officials have tried, and in soft pedalling their problems in the state they opened a substantial credibility gap. "AEC publicity doesn't tell outright lies," says Dr. Metzger. "It tells that part of the truth which is favorable to the AEC and

ignores the rest. The AEC people simply create an incorrect impression in the mind of the listener and allow it to remain there. Only the technically sophisticated questioner can get the whole truth out of them. Let's face it. Congress has charged the AEC to promote atomic energy. We don't expect other promoters to tell the whole truth. Why should we expect it from the AEC?" And more than the credibility gap is involved. The agency, says Dr. Metzger, operates in secrecy, is self-policing, and controls its own information. "That," he adds, "is a recipe for corruption."

The Dow Rocky Flats plant incident justifies all Dr. Metzger's severity. Dow is proud of its industrial safety record. "There are," it points out, "only three industrial records which surpass the Rocky Flats mark," set seven years ago, of 2,122 consecutive days without a disabling injury. What the pamphlets don't mention is that plutonium is pyrophoric—spontaneously combustible—and that fires have been a constant trouble at the plant. The May 11 blaze created an additional and particularly pesky kind of trouble. "After some 18 years of relative obscurity," states a 1970 Plant Information Summary, "the Rocky Flats plant in 1969 was thrust into headlines across the nation."

The plant had been obscure by design: secret weapons work was being done there, which the management did not much like to talk about, any more than it had talked about the fires—almost all of them plutonium—which had preceded the big one, or more than it would talk about those that were to follow it. The leap to national attention was not immediate, however. There were reports about the May 11 fire in the local newspapers, but not until several months had passed and some interesting Congressional testimony was released did the fire make page one headlines. Then it was revealed that nine days after the blaze Defense Department and AEC weapons experts had gone to Congress for a \$45 million emergency appropriation. The fire, they said, had entirely

halted United States nuclear warhead production (Rocky Flats is one of eight interlocking plants manufacturing the warheads).

None of the first official utterances on the subject of the fire indicated the true extent of the damage or gave any hint that there had been contamination of the surrounding area. On this latter point there was, in fact, outright denial. Less than a month after the blaze occurred, Lloyd M. Joshel, Dow's general manager at the plant, issued a statement declaring that "there was no radioactive plume of smoke and there was no other type of release of radioactivity to the atmosphere or the environment." As things developed, it was an unfortunate limb to climb out on.

A November report from the AEC investigating team found evidence of "slight exterior contamination" on the roofs of two buildings, although it stated that "there is no evidence that plutonium was carried beyond the plant boundaries." But this, too, it turned out, was less than the truth. On January 13, a team of investigators for the Environmental Information Committee, headed by former West Pointer Dr. Edward A. Martell, sent a report to Glenn T. Seaborg, chairman of the AEC. It was this report which provoked Lieutenant Governor Hogan's outburst: it relayed the discovery of substantial amounts of plutonium in soil samples taken at distances up to four miles from the plant. Dow and the AEC, the Martell group contended, had used insensitive monitoring equipment and thus had missed the plutonium releases, or had failed to follow up on the possibility that danger might exist. For shortly after the Martell report, an AEC paper entitled "Safety Consideration in the Operations of the Rocky Flats Plutonium Plant" conceded that "smoke from the fire was seen at various times to have drifted off at a low angle to the south." The AEC finally admitted that the fire had indeed released some radiation beyond the plant boundaries. But in contrast to the Martell group, which charged that the

releases were extensive enough to "pose a serious threat to the health and safety of the people of Denver," the agency insisted that the amount was not "significant."

There is general agreement, in which the AEC concurs, that plutonium is terribly dangerous if inhaled—it can, among other things, produce lung cancer. Since its half-life is over 24,000 years, the pollution it brings about is essentially permanent. On the other hand, there is some scientific debate about what constitutes a "safe" level of inhaled plutonium, and the AEC is evidently reluctant to act too hastily. Though the Martell report dwelt on the questionable wisdom of having a major plutonium plant 16 miles from downtown Denver, no such doubts seemed to beset the agency. Rather than moving the fire-prone plant, the AEC was, at the time of the report, busily engaged in repairing it and had started construction on a new \$75 million production building.

On May 2, the Rocky Flat plant held its first family day in 19 years, to counteract some of the bad publicity.

Project Rulison was a different sort of episode. On September 10, 1969 a 40-kiloton fission bomb was exploded 8,442 feet below the surface in a draw leading up to Battlement Mesa, about 45 miles east of Grand Junction. It was not a military test but one aimed at freeing underground supplies of natural gas. It was part of the AEC's Plowshare program, which tries to find useful civilian work for atomic bombs. The industrial co-sponsor was the Austral Oil Company of Houston with CER Geonuclear Corporation of Las Vegas hired as manager.

Before the explosion, much of the opposition centered on the danger that any gas produced by the underground shot might be radioactive. The aim of the test was to crack heavy rock formations which contain natural gas but which release it much too slowly for

profitable commercial development. In other gas and oil fields the cracking is accomplished with hydraulic pressure or conventional explosives. Critics argued that with a nuclear explosion, the gas produced would chemically combine with a form of radioactive hydrogen, called tritium, and become radioactive itself. Other tritium, in the form of water vapor, is released in small quantities. In addition, a quantity of krypton 85, a non-mixing radioactive gas, would be thrown off.

AEC officials said the radioactivity involved would be extremely small. The underground cavity created by the blast, they said, would trap most of the solid radioactive elements, which would mix with the melted rock and form a glass at the bottom of the cavity. Other critical radioactive elements such as iodine 131 decay quickly, and contamination could be avoided by keeping the well shut for six months. The officials pointed to Project Gasbuggy, a 26-kiloton explosion which had been set off in a gas-bearing rock formation near Farmington, New Mexico: the radioactive releases there, they said, had been well within AEC safety limits. In addition, gas drawn off the Gasbuggy well and flared (burned) gradually appeared to flush out its radioactivity as the flaring continued.

Opponents of Rulison included the American Civil Liberties Union, which led a series of court battles to try to have it barred, and various groups of Colorado conservationists and outdoorsmen. Uproar over the project was particularly fierce in Aspen, the ski resort 55 miles east of ground zero, where the city council voted 4-0 against the shot. A public relations panel of experts was sent in—"a traveling dog and pony show", AEC Test Manager Robert Thalgot called it after weathering about 40 such meetings and speeches in the state. Like all the others, the Aspen meeting was strictly for information; the shot was ready to go and would not be stopped. The men from AEC, Austral Oil, CER Geonuclear, the U.S. Public Health Service, and the U.S. Geological Survey

concentrated their arguments on their past safety record (at the time, the AEC had more than 450 atomic explosions behind it) and the caution with which the event was being approached. The largely gray-haired, pipe-smoking group tried a friendly, smiling, easy approach, as men of vast experience. "Do me a favor and stop smiling," an Aspen resident told AEC public relations man David Miller, who brought an angry chorus later when he suggested a generation gap was behind the protests. A middle-aged woman said, "You're playing God with generations yet unborn." Thalgott said that if an atom from the explosion fell on anyone in Aspen, they wouldn't know it and it wouldn't hurt them.

Because of the uproar, Rulison promoters were particularly pleased when the test went off successfully. At first, reports showed "minimal" ground motion. A hailstorm broke over ground zero about an hour after the shot, just as the promoters were gathering in the aluminum trailers at the control point, two-and-a-half miles away. Hailstones rattled off the metal roofs with a roar as Thalgott and the others raised plastic foam cups of domestic champagne and shouted congratulations to each other over the din. The celebration was a bit premature.

The AEC had predicted "no significant damage" from ground motion. The area chosen for the blast had been thoroughly researched by geologists: "A literature search for Colorado earthquakes of magnitude greater than 3 was performed by the Environmental Science Services Administration, U.S. Coast and Geodetic Survey," the Rulison Effects Evaluation Report noted before the explosion, "and of the 300 earthquakes identified, none had epicenters within 50 miles of the Rulison site. This lack of seismic activity further reduces the probability of detectable aftershocks from Rulison."

But predictions did not hold. Geological Engineer David M. Evans of the Colorado School of Mines said the

school's Cecil H. Green Seismic Observatory recorded tremors and earthquakes for 17 days following the explosion. Two days after the blast, he reported, a natural earthquake recorded at 3.5 on the Richter scale.⁹ During the 17 days, there were two magnitude 4 earthquakes and several in the 3.5 range, along with a number of other smaller tremors, all in a 50-mile radius around the blast site. Clearly, he said, the area was "geologically adjusting" to the explosion.

Anxiety about radioactive contamination faded temporarily from the forefront in the clamor over property damages caused by the blast. In a sense, though, the new complications served to intensify the original uneasiness. Unexpected earth movement was only a minor error in the calculations. But the crumbling chimneys and cracked plaster cast shadows over the safety of the entire project. If the AEC had been wrong on that score, reasoned the critics, what basis was there for trusting their other assurances? And the wrangling involved in the settlement of the claims created bitterness and anger on the part of many independent-minded farmers and ranchers.

The questions about radiation from Rulison are still largely unanswered. In contrast to the case at Rocky Flats, however, there seems to be a possibility that the AEC may have to come to grips with them more satisfactorily before proceeding with business as usual. The decision of Denver's Federal District Court to permit the shot does not apply to the 200-odd additional explosions of which it was slated to be the forerunner, and in the next inevitable round of court tests the opposition's ammunition is bound to be more formidable than before.

No such optimism is warranted in the matter of the uranium tailings, chiefly because it is too late to wipe out the damage already done. But if the AEC cannot be faulted for failing to take appropriate action now, its initial con-

tribution to the problem provides perhaps the most dramatic example of its lack of foresight and responsibility. The nine uranium mills (out of 17 in the Colorado River Basin) which have left the huge piles of leftovers from the ore-grinding process around the state were established in direct response to the agency's needs. Only two of the mills remain open, but the hazards produced by the early carelessness will if anything become more grave as the years go on.

Uranium is always found with its "daughter" products—the new elements formed as it gives off radiation and decays. Thorium 230 and radium 226 are some of these daughters. Radium, in its turn, decays and gives off radon gas, which decays still further into polonium and radioactive forms of bismuth and lead. All of these elements are found in the tailings. And breathing radon daughters has been acknowledged since the turn of the century as a prime cause of lung cancer, notably among miners.

At the Old West town of Durango, two piles totaling 1.7 million tons sit on rock ledges over the Animas River. They are just across the river from downtown and from the picturesque narrow gauge railroad that hauls tourists up the mountains to the old mining town of Silverton. Before the Foote Mineral Company was forced to grow grass on the pile, the dusty tailings used to blow, when the wind was right, directly over the downtown section. Some tailings also slid from their precipitous location and almost made it into the river. Others were washed down by rains. A Federal Water Pollution Control Agency study in 1966 reported dissolved radium concentrations immediately downstream from the mill were about four times above permissible levels. Twice as much as the permissible level was measured 30 miles downstream, while near-maximum levels were found 60 miles away.

The AEC, noting that it is not charged with the supervision of tailings, has taken only an occasional interest in the problem. It likes to emphasize the brighter side, preferring to quote from

another section of the same 1966 water pollution study. The part it uses states: "There is currently no significant immediate hazard associated with uranium milling activities anywhere in the Colorado River Valley." The quotation is taken from a section in the report called "Background." But the preface makes clear that significant immediate hazard was not the subject of the report: "The FWPCA wishes to emphasize that it is not especially concerned regarding immediate hazards from abandoned uranium mill tailings. Rather, the Administration is concerned with the potential problems that appear to be associated with the tailings because of their extremely long-lived radioactivity." It recommends "interim" measures covering the next 10 to 20 years.

But the piles are a long-time proposition. Radium 226 has a half-life of 1,620 years, thorium 230, 80,000 years, and lead 210, 22 years. Plans of an appalling long range will have to be drawn up. At the insistence of Colorado health officials, most of the piles have now been covered, and new pollution to the rivers is within acceptable limits. But as far as radon gas is concerned, covering the piles with grass is roughly comparable to wrapping an onion in gauze.

In Grand Junction the tailings situation is even more complex and troublesome. For 15 years, until the practice was stopped in 1966, builders removed tailings from the American Metal Climax, Inc., uranium-vanadium mill. Now shut down, the mill gave tailings away free, and builders used them for fill under homes, offices, businesses, and public buildings. The tailings, spread eight to 12 inches thick, give off radon gas. The gas itself has a half-life of only 3.8 days, but that is enough time for it to seep through the concrete before producing its radioactive daughters, which remain suspended and can be inhaled. At least 3,000 buildings put up during a 15-year period are believed to have tailings under them. Of 345 identified buildings tested, about 150 have shown advanced readings, according to

Robert D. Siek, of the Colorado Department of Health.

The highest reading in a Grand Junction building has been 1.8 working levels, 180 times above a recommended level of 0.01. This reading was based on a preliminary, or "grab" sample—a quick technique which is often inaccurate and usually too low. More complex sampling equipment is being installed in a number of buildings to test the full effect of radioactivity. The Colorado Bureau of Mines attempts to keep mine working areas below 1 working level. Between 1 and 2 working levels, fans are required to ventilate the mine shafts. At 2 working levels, the area is cleared of all workmen. This eight-hour occupational exposure five days a week compares to a 24-hour-a-day exposure seven days a week in a private home.

Clearly, if the early "grab" sample readings begin to prove out, there will have to be some evacuation of buildings in Grand Junction. There has been none thus far. The situation is especially critical in school buildings and homes with young children, who are more susceptible to radiation-induced cancers than adults. For the most part, however, symptoms do not show up for 20 or 25 years. There is no "significant immediate hazard," so the city, though a trace worried, mostly ignores the problem for now. And the AEC has done nothing to alert it to the full extent of the danger or to discourage attitudes like that of Barclay Jameson, news director of the Grand Junction *Sentinel*, who complained in a March 8 article that the radon scare story "seems to be whipping up more frenzied excitement the further you get from Grand Junction . . . ABC came up with a report that left the viewers with the impression that Grand Junction was turning into a ghost town . . . That last bit drove me into the fit of temper I often end up in when dealing with the provincial jackasses back east . . ." It was a good-natured article, kidding outside reporters who sat smoking at his desk and asking questions about radon. "I should think that they personally

would be a lot more worried about getting zapped by those cigarettes they are smoking than by the sand underneath a concrete slab in a burg out west."

A related area in which the AEC has shown a bizarre and frightening casualness is the mortality rate among miners carving out the ore for its needs. The figures on cancer deaths from radon daughters go back to the turn of the century and the mines in Schneeberg, Austria, and Joachimsthal, Czechoslovakia. At Schneeberg, miners digging pitchblende for early radium experiments, had lung cancer rates 54 times those of the general population. At Joachimsthal, where permissible working levels were about half as high as at Schneeberg, the rate was 29 times that of the general population. Warned by such figures, the U.S. set still more stringent working levels, but they were only loosely applied. In several mines on Navajo Indian lands, for example, natural ventilation alone was used along with wet drilling to keep dust down. Naturally, radon daughter levels were reported alarmingly high. Not surprisingly, 170 miners have already died of lung cancer attributed to radon daughters, according to the U.S. Public Health Service, with an expected 600 to 1,100 more to come.

Here, too, the AEC prefers to look on the bright side. While stressing that it has no legal responsibility in the matter, the agency stated in a recent staff paper (written to rebut criticism by Dr. Metzger) that things seemed to be improving among miners. The paper then listed—incorrectly—figures compiled on cancer deaths. "We believe it is important to note that 12 new cases were reported by Dr. Geno Saccomanno, pathologist, St. Mary's Hospital, Grand Junction, Colorado, in 1967 [the actual number was 16], 11 in 1968 [again it was 16], and 10 in 1969 [this time it was nine]." The same paper took an encouraging view of the results of increased mine ventilation.

Such enthusiasm, however, was hardly characteristic of a recent report to the Western Interstate Nuclear Board by E.L. Kaufman, radiological health supervisor for the state of New Mexico. Some mines in the state, he said, are moving 300,000 cubic feet of air per minute into a working area, compared with 20,000 cubic feet a few years ago, and the death rate still has not gone down. The massive ventilation has caused bizarre scenes of miners working in 35-mile-an-hour winds in temperatures of 50 degrees below zero with the snow falling underground, he said.

The sensitivity of the radon issue was reflected by the Federal Radiation Council, a group of Presidential Cabinet officers with a technical staff which advises the President and the AEC on radiation safety. In December, 1968—those lame-duck days of an Administration when controversial subjects can be brought up with little political repercussion—the Council sent a memo to President Johnson which said in part: “We do not know at precisely what exposure level uranium miners may be exposed without significantly increasing the risk of lung cancer. But we do know that the mortality rates from the disease in the lower exposure categories are higher than the expected rate.” The Department of Labor this year cut permissible exposure from 1 to 0.33 working levels. Such cuts drive up the cost of uranium mining, so delays have been granted while the Arthur D. Little Company studies the impact of the cut on the uranium industry. The \$200,000 study is financed by the AEC.

This April, nearly a year after the Rocky Flats fire, an editorial in the *Town and Country Review*, a Boulder County weekly newspaper, stated: “Dow’s policy or lack of policy in disseminating information has increased suspicion that they have something to hide The public is no longer prepared to accept the ‘big brother attitude’ on the dangers of plutonium pollution

or anything else for that matter At present the AEC seems to maintain that the public must prove a facility to be dangerous before any action is taken. The reverse should be true” In the same month, Cal Queal, the environment editor of the *Denver Post*, wrote in his column: “The real story of Rulison has nothing to do with kilotons, cubic feet or micro-curies It’s a story of people who are frightened and angry. It’s a story of a triumph of modern press agency. Sadly, it’s the story of an outrage committed by the government against its own people.”

Candidate Hogan is not yet completely comfortable with the politics of the whole thing. “It’s still something of a lost cause at this point,” he says. “I wish more people were concerned about it, and I hope it catches up by November.” But, he adds, “I’m beginning to get the benefit of being an early prophet.”

In any case, Coloradians may soon have some other atomic projects to worry about. The state is getting its own nuclear electric generator, which, having weathered a storm of early objections, is now under construction north of Denver. The Health Department’s Robert Siek, who is chief of the radiological health division, has said that the gas-cooled, high-temperature reactor being built for the Public Service Company of Colorado will probably meet stringent new pollution standards. But the department, he says, is still looking with misgivings at a year-old proposal to build an atomic graveyard in the state to bury radioactive wastes. Such graveyards are similar to the tailings piles—they will be around for many generations to come.

Meanwhile, Dr. Martell, who worked on the plutonium study at Rocky Flats, tells visitors occasionally that he wonders if man was ever meant to dabble in the transuranium elements—those man-made elements like plutonium beyond uranium on the periodic chart. And other concerned people display bumper stickers reading:

COLORADO, PLAYGROUND OF THE AEC ■

ATOMIC
POWER
ABUSE:

The Marginal Nuclear Utilities

by Richard Karp

The Atomic Energy Commission is headed for increasing trouble on two fronts: environmental and economic. Over the past few years, the environmentalists' sallies against the agency have been slowly gaining ground, despite the AEC'S contention that concern over thermal pollution is unnecessarily morbid ("thermal enrichment" is the agency term for waterways overheated by radioactive wastes), that fear of reactor explosions ("incidents") is unfounded, and that apprehension over the effects of radioactive smoke is somehow a mark of hypochondria (there is no evidence, the AEC says, that the smoke is harmful).

Now the AEC's balance sheets are beginning to look as bad as its radioactive emissions. The agency's efforts to develop nuclear-powered electricity have failed; utility companies, burned more than once by AEC nuclear reactors, are going back to conventional sources of electricity. But the agency—true to its

mission as promoter of things radioactive—has responded by asking Congress for funds to launch another kind of reactor, the "fast breeder," that is technologically dubious and economically unsound—and extremely hazardous besides. The fast-breeder will not provide cheaper electricity; it will, however, contain the potential for accidental nuclear explosions that would dwarf any of the incidents that have taken place so far.

Such is the sorry state of the dream, born in 1945, that atomic power could somehow be harnessed to provide us with virtually infinite amounts of electrical power. In 1946, Congress created the Atomic Energy Commission with unique authority to regulate, promote and operate atomic power—a virtual government monopoly over a potential industry. In the following few years the AEC devoted itself to one task—building atomic bombs for the Department of Defense. With the Cold War providing lots of business for the bomb-makers, the early enthusiasm for a civilian nu-

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